Changes for the Better

MITSUBISHI

PROGRAMMABLE CONTROLLERS

MELSEC-F

HARDWARE MANUAL

FX1N SERIES PROGRAMMABLE CONTROLLERS



FX1N

Foreword

- This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX1N Series Programmable Controllers. It should be read and understood before attempting to install or use the unit.
- Further information can be found in the FX Series Programming Manual II.
- If in doubt at any stage of the installation of an FX1N Series Programmable Controller always consult a professional electrical engineer who is qualified and trained to the local and national standards which apply to the installation site.
- If in doubt about the operation or use of FX1N Series Programmable Controller please consult the nearest Mitsubishi Electric distributor.
- This manual is subject to change without notice.

ISO 9001

UKAS QUALITY MANAGEMENT 008

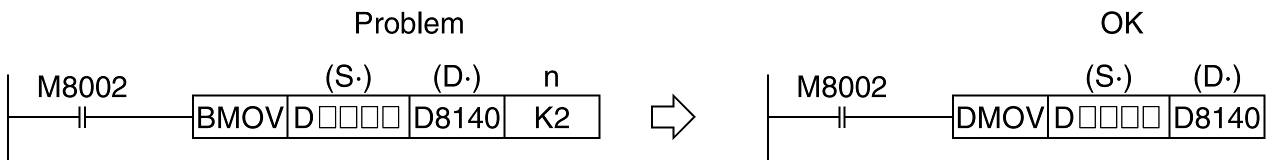
FX1N SERIES PROGRAMMING CAUTION

Thank you for buying The Mitsubishi FX1N series controller.
Please note the following.

Notes: Block Move instruction

Applicable PLC: FX1N Ver 1.00-2.10
Applicable instructions: BMOV, BMOVP(FNC15)
If the file register parameter setting and the registers D8000-D8225 are used as the destination devices for the BMOV(BMOVP) instruction, program steps or file register data may be lost or damaged. All other data registers can be used safely for BMOV(BMOVP) instruction destination registers.

Program example



FX1N Series Programmable Controllers

Hardware Manual

Manual number : JY992D89301

Manual revision : K

Date : November 2005

Guidelines for the safety of the user and protection of the FX1N.

This manual provides information for the installation and use of the FX1N. The manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows;

a) Any engineer who is responsible for the planning, design and construction of automatic equipment using the product associated with this manual should be of a competent nature, (trained and qualified to the local and national standards required to fulfill that role). These engineers should be fully aware of all aspects of safety with regards to automated equipment.

b) Any commissioning or service engineer must be of a competent nature, trained and qualified to the local and national standards required to fulfill that job. These engineers should also be trained in the use and maintenance of the completed product. This includes being completely familiar with all associated documentation for the said product. All maintenance should be carried out in accordance with established safety practices.

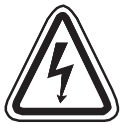
c) All operators of the completed equipment (see Note) should be trained to use that product in a safe manner in compliance to established safety practices. The operators should also be familiar with documentation which is associated with the operation of the completed equipment.

Note : The term ‘completed equipment’ refers to a third party constructed device which contains or uses the product associated with this manual.

Note's on the symbols used in this manual

At various times through out this manual certain symbols will be used to highlight points of information which are intended to ensure the users personal safety and protect the integrity of the equipment. Whenever any of the following symbols are encountered, its associated note must be read and understood. Each of the symbols used will now be listed with a brief description of its meaning.

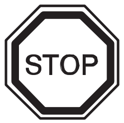
Hardware warnings



1) Indicates that the identified danger **WILL** cause physical and property damage.



2) Indicates that the identified danger could **POSSIBLY** cause physical and property damage.



3) Indicates a point of further interest or further explanation.

Software warning



1) Indicates special care must be taken when using this element of software.



2) Indicates a special point which the user of the associate software element should be aware of.



3) Indicates a point of interest or further explanation.

- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- Please contact a Mitsubishi Electric distributor for more information concerning applications in life critical situations or high reliability.

Note Concerning the CE Marking

This note does not guarantee that an entire mechanical module produced in accordance with the contents of this note will comply with the following standards. Compliance to EMC directive and LVD directive of the entire mechanical module should be checked by the user / manufacturer.
For more details please contact the local Mitsubishi Electric sales site.

EMC

The following products have shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Directive for Electromagnetic Compatibility (89/336/EEC) when used as directed by the appropriate documentation.
Refer to a manual or related material of each product for details concerning products not included below.

Type : Programmable Controller (Open Type Equipment)

Models : MELSEC FX1N series manufactured

from March 1st, 2000	FX1N-232-BD	FX1N-485-BD	FX1N-422-BD
	FX1N-8AV-BD	FX1N-CNV-IF	FX1N-5DM
	FX1N-EEPROM-8L		
from June 1st, 2000	FX1N-☆☆MR-ES/UL		
from December 1st, 2000	FX1N-☆☆MR-DS	FX1N-☆☆MT-DSS	
	Where ☆☆ indicates:14,24,40,60		

from June 1st, 2001	FX1N-4EX-BD	FX1N-2EYT-BD	FX1N-2AD-BD
	FX1N-1DA-BD		
from July 1st, 2001	FX1N-☆☆MT-ESS/UL Where ☆☆ indicates:14,24,40,60		

Models : MELSEC FX0N series manufactured

from November 1st, 1995	FX0N-40ER-ES,	FX0N-8EX-ES,	FX0N-8EYR-ES,
	FX0N-8EYT-ESS		
from February 1st, 1996	FX0N-8ER-ES,	FX0N-16EX-ES,	FX0N-16EYR-ES,
	FX0N-16EYT-ESS		
from April 1st, 1996	FX0N-8ER-ES/UL,	FX0N-16EX-ES/UL,FX0N-16EYR-ES/UL,	
	FX0N-16EYT-ESS/UL		
from May 1st, 1996	FX0N-40ER-DS,	FX0N-40ET-DSS	
	FX0N-232ADP,	FX0N-485ADP	
from July 1st, 1996	Harmonized Products		
	FX0N-40ER-ES/UL,	FX0N-8EX-ES/UL,FX0N-8EYR-ES/UL,	
	FX0N-8EYT-ESS/UL		

Models : MELSEC FX2NC series manufactured

from October 1st, 2002	FX2NC-232ADP	FX2NC-485ADP

Standard		Remark
EN50081-2:1993 EN61000-6-4:2001	Electromagnetic compatibility - Generic emission standard Industrial environment	Compliance with all relevant aspects of the standard. (Radiated Emissions and Mains Terminal Voltage Emissions)
EN61000-6-2:2001	Electromagnetic compatibility - Generic immunity standard Industrial environment	Compliance with all relevant aspects of the standard. (RF immunity,Fast Transients,ESD,Conducted, Surge, Power magnetic fields,Voltage dips and Voltage interruptions)

Models : MELSEC FX2N series manufactured

from July 1st, 1997	FX2N-★★ER-ES/UL	FX2N-★★ET-ESS/UL
	Where ★★ indicates:32,48	
	FX2N-16EX-ES/UL	FX2N-16EYR-ES/UL
	FX2N-16EYT-ESS/UL	
from April 1st, 1998	FX2N-48ER-DS	FX2N-48ET-DSS
from August 1st, 1998	FX2N-48ER-UA1/UL	
from August 1st, 2005	FX2N-8ER-ES/UL	FX2N-8EX-ES/UL
	FX2N-8EYR-ES/UL	FX2N-8EYT-ESS/UL

to March 31st,2002 [compliance with EN50081-2 (EN61000-6-4) and EN50082-2]
from April 1st 2002:Above mentioned products [compliance with EN50081-2 (EN61000-6-4) and EN61131-2]

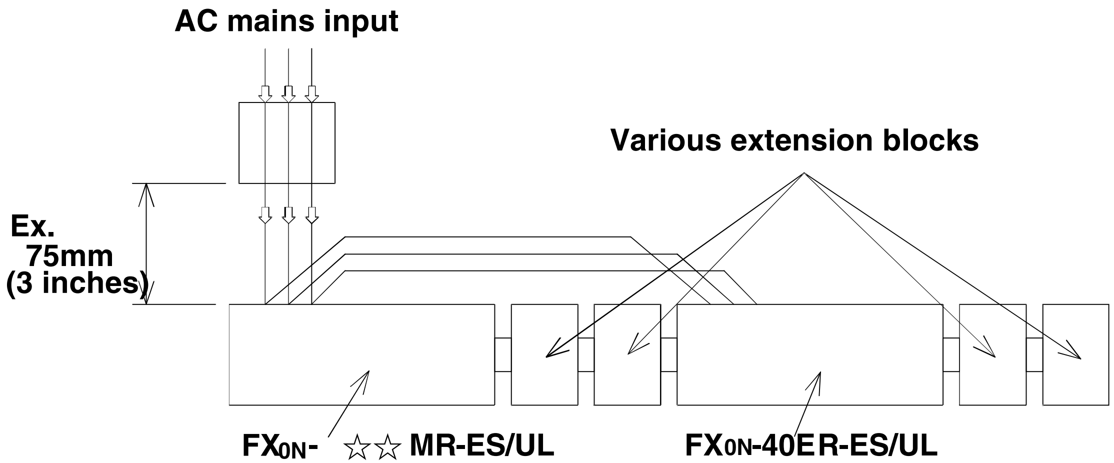
Standard		Remark
EN50081-2:1993 EN61000-6-4 :2001	Electromagnetic compatibility - Generic emission standard Industrial environment	Compliance with all relevant aspects of the standard. (Radiated Emissions and Mains Terminal Voltage Emissions)
EN50082-2:1995	Electromagnetic compatibility - Generic immunity standard Industrial environment	Compliance with all relevant aspects of the standard. (RF immunity,Fast Transients,ESD,Conducted, and Power magnetic fields)
EN61131-2:1994 /A11:1996 /A12:2000	Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. (RF Immunity, Fast Transients , ESD and Damped oscillatory wave)

Notes when using the FX0N-40ER-ES.

This unit may be used as supplied and will be in compliance with the previously identified standards / directives.However, it is recommended as an additional precaution to reduce conducted mains terminal voltage emissions when power sources are shared, that an external mains filter is used. Mitsubishi have tested and would like to recommend the following filters (or user selected filters which are manufactured / designed/used in a similar manner to those identified here):

Filter #1: Manufacturer	Filter #2: Manufacturer	Filter #3: Manufacturer
Volgen	TDK	Roxburgh Electronics
Unit - VFB-05B	Unit -ZHG2203-11S	Unit - DRF1, DRF3 range of filters

For the most effective use of any filtering system the following configuration should be adopted, always remembering to keep the filter as close to the power input port as possible. For example only:



LVD

The following products have shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Directive for Low Voltage (73/23/EEC) when used as directed by the appropriate documentation.
Refer to a manual or related material of each product for details concerning products not included below.

Type : Programmable Controller (Open Type Equipment)

Models : MELSEC FX1N series manufactured

from June 1st, 2000 FX1N-☆☆MR-ES/UL

from December 1st, 2000 FX1N-☆☆MR-DS

from July 1st, 2001 FX1N-☆☆MT-ESS/UL
Where ☆☆ indicates:14,24,40,60

Standard		Remark
EN61010-1:2001	Safety requirements for electrical equipment for measurement, control,and laboratory use - General requirements	The equipment has been assessed as a component for fitting in a suitable enclosure which meets the requirements of EN61010-1:2001

Models : MELSEC FX0N series manufactured

from November 1st, 1995	FX0N-40ER-ES,	FX0N-8EX-ES,	FX0N-8EYR-ES,
	FX0N-8EYT-ESS		
from February 1st, 1996	FX0N-8ER-ES,	FX0N-16EX-ES,	FX0N-16EYR-ES,
	FX0N-16EYT-ESS		
from April 1st, 1996	FX0N-8ER-ES/UL,	FX0N-16EX-ES/UL,	FX0N-16EYR-ES/UL,
	FX0N-16EYT-ESS/UL		
from May 1st, 1996	FX0N-40ER-DS,	FX0N-40ET-DSS	
from July 1st, 1996	Harmonized Products		
	FX0N-40ER-ES/UL,	FX0N-8EX-ES/UL,	FX0N-8EYR-ES/UL,
	FX0N-8EYT-ESS/UL		

Standard		Remark
IEC1010-1:1990 /A1:1992 /A2:1995 BSEN61010-1 :1993 * /A2:1995	Safety requirements for electrical equipment for measurement,control,and laboratory use	The equipment has been assessed as a component for fitting in a suitable enclosure which meets the requirements of IEC 1010-1:1990, A1:1992 and A2:1995(BSEN61010-1 :1993 and A2:1995)

* Compliance to BSEN61010-1 and Amendment2 is claimed through virtue of direct compliance to IEC1010-1, Amendment 1 and Amendment 2.

Models : MELSEC FX2N series manufactured

from July 1st, 1997	FX2N-★★ER-ES/UL Where ★★ indicates:32,48 FX2N-16EYR-ES/UL	FX2N-★★ET-ESS/UL
from April 1st, 1998	FX2N-48ER-DS	
from August 1st, 1998	FX2N-48ER-UA1/UL	FX2N-16MR-DS
from August 1st, 2005	FX2N-8ER-ES/UL FX2N-8EYR-ES/UL	FX2N-8EX-ES/UL FX2N-8EYT-ESS/UL

to March 31st,2002(compliance with IEC1010-1)
from April 1st 2002:Above mentioned products(compliance with EN61131-2)

Standard		Remark
IEC1010-1:1990 /A1:1992	Safety requirements for electrical equipment for measurement, control,and laboratory use - General requirements	The equipment has been assessed as a component for fitting in a suitable enclosure which meets the requirements of IEC 1010-1:1990+A1:1992
EN61131-2:1994 /A11:1996 /A12:2000	Programmable controllers - Equipment requirements and tests	The equipment has been assessed as a component for fitting in a suitable enclosure which meets the requirements of EN61131-2:1994+A11:1996 +A12:2000

Associated Manuals

The following manuals are recommended as essential reference material for the correct operation of a FX1N series Programmable controller.

Manual Name	Manual Number	Description
FX Programming Manual II	JY992D88101	This manual contains instruction explanation about FX1S, FX1N, FX2N and FX2NC Series PLC.
FX Communication User's Manual	JY992D69901	This manual contains explanation for N:N network, parallel link, no protocol communication and computer link
FX1N-5DM User's Manual	JY992D84901	This manual contains hardware explanation for installation, specification and operation.
FX-10DM-E User's Manual	JY992D86401	This manual contains hardware explanation for installation, specification and operation.
FX1N-422-BD Users Manual	JY992D84101	This manual contains hardware explanation for installation and specification.
FX1N-485-BD Users Manual	JY992D84201	This manual contains hardware explanation for installation and specification.
FX1N-232-BD Users Manual	JY992D84401	This manual contains hardware explanation for installation and specification.
FX1N-4EX-BD Users Manual	JY992D95001	This manual contains explanation for installation, specification and special auxiliary relay allocation.
FX1N-2EYT-BD Users Manual	JY992D95201	This manual contains explanation for installation, specification and special auxiliary relay allocation.

Manual Name	Manual Number	Description
FX1N-2AD-BD Users Manual	JY992D96201	This manual contains explanation for installation, specification and special auxiliary relay allocation.
FX1N-1DA-BD Users Manual	JY992D96401	This manual contains explanation for installation, specification and special auxiliary relay allocation.
FX1N-8AV-BD	JY992D84601	This manual contains hardware explanation for installation and specification.
FX1N-CNV-BD	JY992D84701	This manual contains explanation for installation.
FX0N-3A User's Manual	JY992D49001	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-5A User's Manual	JY997D11401	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-2DA User's Manual	JY992D74901	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-2AD User's Manual	JY992D74701	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-4DA User's Manual	JY992D65901	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-4AD User's Manual	JY992D65201	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-4AD-PT User's Manual	JY992D65601	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-4AD-TC User's Manual	JY992D65501	This manual contains explanation for wiring, installation, specification and BFM allocation.

Manual Name	Manual Number	Description
FX2N-8AD User's Manual	JY992D86001	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-2LC User's Manual	JY992D85801	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-16LNK-M MELSEC I/O Link Master User's Manual	JY992D73701	This manual contains explanation for wiring, installation, setting, specification and I/O allocation.
FX2N-16CCL-M CC-Link System Master User's Manual	JY992D93101	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-32CCL CC-Link System Interface User's Manual	JY992D71801	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-64CL-M CC-Link System Master User's Manual	JY997D08501	This manual contains explanation for wiring, installation, specification and BFM allocation.
FX2N-32ASI-M AS-interface Master User's Manual	JY992D76901	This manual contains explanation for wiring, installation, specification and BFM allocation.

MEMO

Table of Contents

1. Introduction

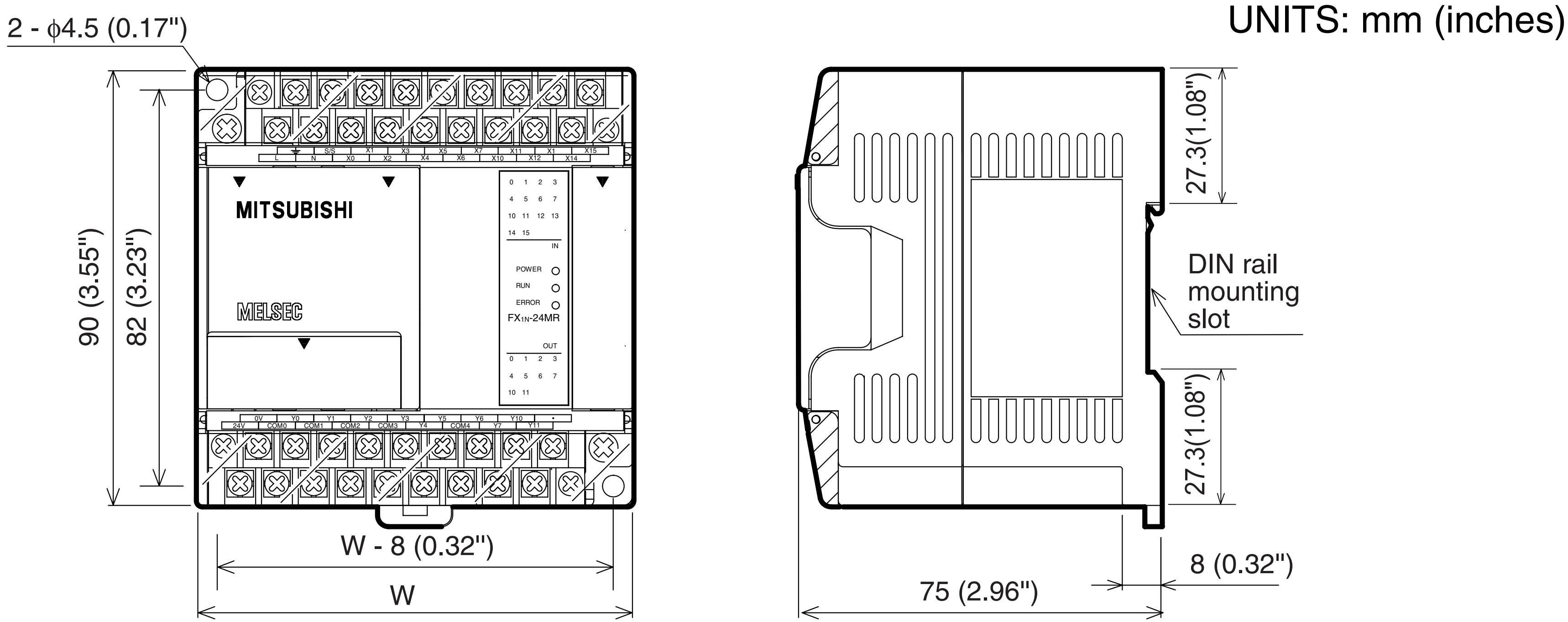
This manual covers hardware installation instructions for the FX1N Series PLC.

Table 1.1: FX1N Main Modules

MODEL	INPUT		OUTPUT		POWER SUPPLY	DIMENSIONS mm (inches)			WEIGHT kg (lbs)
	QTY	TYPE	QTY	TYPE					
FX1N-14MR-ES/UL	8	24V DC Sink/ Source	6 (8)	Relay	100-240 VAC +10% -15% 50/60Hz	90 (3.55)	90 (3.55)	75 (2.96)	0.45 (0.99)
FX1N-14MT-ESS/UL				Transistor					
FX1N-24MR-ES/UL	14 (16)		10 (16)	Relay		90 (3.55)			0.45 (0.99)
FX1N-24MT-ESS/UL				Transistor					
FX1N-40MR-ES/UL	24		16	Relay		130 (5.12)			0.65 (1.43)
FX1N-40MT-ESS/UL				Transistor					
FX1N-60MR-ES/UL	36 (40)		24	Relay		175 (6.89)			0.80 (1.76)
FX1N-60MT-ESS/UL				Transistor					
FX1N-14MR-DS	8	24V DC Sink/ Source	6 (8)	Relay	12V DC -15% to 24V DC +20%	90 (3.55)	90 (3.55)	75 (2.96)	0.45 (0.99)
FX1N-14MT-DSS				Transistor					
FX1N-24MR-DS	14 (16)		10 (16)	Relay		90 (3.55)			0.45 (0.99)
FX1N-24MT-DSS				Transistor					
FX1N-40MR-DS	24		16	Relay		130 (5.12)			0.65 (1.43)
FX1N-40MT-DSS				Transistor					
FX1N-60MR-DS	36 (40)		24	Relay		175 (6.89)			0.80 (1.76)
FX1N-60MT-DSS				Transistor					

Note: Occupied points are shown in brackets for input and outputs.

Figure 1.1 :Main unit outline



Please see the previous page for each units width measurement.

Table 1.2: Powered Extension Units

<table>
<tr><th rowspan="2">MODEL</th><th colspan="2">INPUT</th><th colspan="2">OUTPUT</th><th rowspan="2">POWER SUPPLY</th><th rowspan="2" colspan="3">DIMENSIONS mm (inches)</th><th rowspan="2">WEIGHT kg (lbs)</th></tr>
<tr><th>QTY</th><th>TYPE</th><th>QTY</th><th>DEVICE</th></tr>
<tr><td>FX0N-40ER-ES/UL</td><td>24</td><td rowspan="7">24V DC Sink/ Source</td><td>16</td><td>Relay</td><td>100-240VAC +10%, -15% 50/60Hz</td><td rowspan="3">150 (5.91)</td><td rowspan="8">90 (3.55)</td><td rowspan="8">87 (3.43)</td><td rowspan="3">0.75 (1.65)</td></tr>
<tr><td>FX0N-40ET-DSS</td><td>24</td><td>16</td><td>Transistor (Source)</td><td rowspan="2">24VDC +20% -15%</td></tr>
<tr><td>FX0N-40ER-DS</td><td>24</td><td>16</td><td>Relay</td></tr>
<tr><td>FX2N-32ER-ES/UL</td><td>16</td><td>16</td><td>Relay</td><td rowspan="3">100-240VAC +10%, -15% 50/60Hz</td><td rowspan="2">150 (5.91)</td><td rowspan="2">0.65 (1.43)</td></tr>
<tr><td>FX2N-32ET-ESS/UL</td><td>16</td><td>16</td><td>Transistor (Source)</td></tr>
<tr><td>FX2N-48ER-ES/UL</td><td>24</td><td>24</td><td>Relay</td><td rowspan="2">182 (7.17)</td><td rowspan="2">0.85 (1.87)</td></tr>
<tr><td>FX2N-48ET-ESS/UL</td><td>24</td><td>24</td><td>Transistor (Source)</td><td rowspan="2">100-240VAC +10%, -15% 50/60Hz</td></tr>
<tr><td>FX2N-48ER-UA1/UL</td><td>24</td><td>110VAC</td><td>24</td><td>Relay</td><td>220 (8.67)</td><td>1.00 (2.2)</td></tr>
</table>

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Table 1.3: Extension blocks

MODEL	INPUT		OUTPUT			DIMENSIONS mm (inches)			MASS (WEIGHT) kg (lbs)
	QTY	TYPE	QTY	DEVICE	TYPE				
FX0N-8EX-UA1/UL FX2N-8EX-UA1/UL	8	110V AC inputs	-	-	-	43 (1.70)	90 (3.55)	87 (3.43)	0.2 (0.44)
FX0N-8EX-ES/UL FX2N-8EX-ES/UL	8	24V DC Sink/ Source	-	-	-				
FX0N-8ER-ES/UL FX2N-8ER-ES/UL	4		4	Relay	-				
FX0N-8EYR-ES/UL FX2N-8EYR-ES/UL	-	-	8		-				
FX0N-8EYT-ESS/UL FX2N-8EYT-ESS/UL	-	-	8	Transistor	Source				
FX0N-16EX-ES/UL	16	24V DC Sink/ Source	-	-	-	70 (2.76)			0.3 (0.66)
FX0N-16EYR-ES/UL	-	-	16	Relay	-				
FX0N-16EYT-ESS/UL	-	-	16	Transistor	Source				
FX2N-16EX-ES/UL	16	24V DC Sink/ Source	-	-	-	40 (1.58)	90 (3.55)	87 (3.43)	0.3 (0.66)
FX2N-16EYR-ES/UL	-	-	16	Relay	-				
FX2N-16EYT-ESS/UL	-	-	16	Transistor	Source				

Table 1.4: Special function blocks

<table>
<tr><th>MODEL</th><th>DESCRIPTION</th><th colspan="3">DIMENSIONS
mm (inches)</th><th>MASS (WEIGHT)
kg (lbs)</th></tr>
<tr><td>FX0N-3A</td><td>Analog / Digital converter</td><td>43 (1.70)</td><td rowspan="15">90 (3.5)</td><td rowspan="8">87 (3.43)</td><td>0.2 (0.44)</td></tr>
<tr><td>FX2N-5A</td><td>Analog / Digital converter</td><td>55 (2.17)</td><td>0.3 (0.66)</td></tr>
<tr><td>FX2N-2DA</td><td>Digital to analog converter</td><td rowspan="2">43 (1.70)</td><td rowspan="2">0.2 (0.44)</td></tr>
<tr><td>FX2N-2AD</td><td>Analog to digital converter</td></tr>
<tr><td>FX2N-4DA</td><td>Digital to analog converter</td><td rowspan="4">55 (2.17)</td><td rowspan="6">0.3 (0.66)</td></tr>
<tr><td>FX2N-4AD</td><td>Analog to digital converter</td></tr>
<tr><td>FX2N-4AD-PT</td><td>PT 100 probe interface</td></tr>
<tr><td>FX2N-4AD-TC</td><td>Thermo-couple interface</td></tr>
<tr><td>FX2N-8AD</td><td>Analog input interface</td><td>75 (2.96)</td><td>75 (2.96)</td></tr>
<tr><td>FX2N-2LC</td><td>Temperature Control</td><td>55 (2.17)</td><td rowspan="6">87 (3.43)</td></tr>
<tr><td>FX2N-16LNK-M</td><td>MELSEC I/O LINK
Remote I/O system master</td><td rowspan="4">43 (1.70)</td><td>0.5 (1.1)</td></tr>
<tr><td>FX2N-16CCL-M</td><td>CC-Link master</td><td>0.4 (0.88)</td></tr>
<tr><td>FX2N-32CCL</td><td>CC-Link interface</td><td>0.2 (0.44)</td></tr>
<tr><td>FX2N-64CL-M</td><td>CC-Link/LT master</td><td>0.15 (0.33)</td></tr>
<tr><td>FX2N-32ASI-M</td><td>AS-interface master</td><td>55 (2.17)</td><td>0.2 (0.44)</td></tr>
</table>

Table 1.5 :Expansion Board and Communication Adapter

MODEL	DESCRIPTION	DIMENSIONS			MASS (WEIGHT) kg (lbs)
FX1N-4EX-BD	Four point special input	Mounts directly into top of PLC			Mounts directly into top of PLC
FX1N-2EYT-BD	Two point special output				
FX1N-2AD-BD	Two channel special analog to digital converter				
FX1N-1DA-BD	One channel special digital to analog converter				
FX1N-232-BD	RS-232C communication interface				
FX1N-422-BD	RS-422 communication interface				
FX1N-485-BD	RS-485 communication interface				
FX1N-8AV-BD	Analog potentionmeter				
FX1N-CNV-BD	Communication adapter connection interface				
FX2NC-232ADP[*1]	RS-232C commuication adapter	19.1 (0.76)	90 (3.55)	85 (3.35)	0.1 (0.22)
FX0N-232ADP[*1]	RS-232C commuication adapter	43 (1.70)		68 (2.68)	
FX2NC-485ADP[*1]	RS-485 commuication adapter	19.1 (0.76)		78 (3.08)	
FX0N-485ADP[*1]	RS-485 commuication adapter	43 (1.70)		87 (3.43)	0.3 (0.66)

*1 The communication adapter needs to connect via an FX1N-CNV-BD to the FX1N Series PLC.

1.1 World Specification.

Table 1.6: World Specification

Input Sink / Source	World spec models : SINK / SOURCE. Japanese models : ALWAYS SINK.
Outputs Transistor	World spec models : ALWAYS SOURCE. Japanese models : ALWAYS SINK.

1.2 Model Name

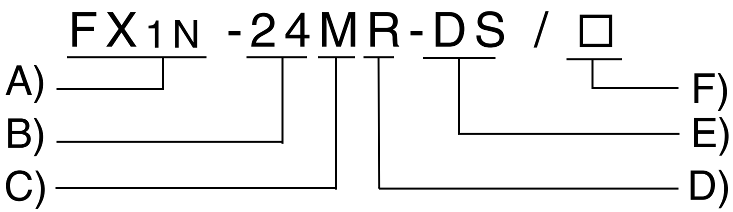


Table 1.7 :Notes on model name

Ref.		Description
A)		PLC type: FX1N
B)		Total number of I / O channels
C)		**Unit type**
	M	MPU - main unit
	E	Powered extension unit
	EX	Extension block, input
	EY	Extension block, output
D)		**Output type**
	R	Relay
	T	Transistor
	S	Triac (SSR)

Ref.		Description
E)		**Features**
	Omit	AC, Japanese spec.
	D	DC Japanese spec.
	DS	DC World spec, CE & UL registered.
	DSS	DC World spec, DC source transistor, CE & UL registered.
	E	AC, Japanese spec.
	ES	AC, World spec, CE registered.
	ESS	AC World spec, DC source transistor, CE registered.
	UA1	AC Power Supply, AC inputs, CE registered.
F)	UL	UL registered

*1. The FX0N-40ET-DSS and FX0N-40ER-DSS FX0N series extension units do not have UL certification.

1.3 Serial Numbers

SERIAL NO.: 0 6 3267

1)

e.g.
0=2000
1=2001

2)

1 - 9 = Jan - Sept
X = Oct
Y = Nov
Z = Dec

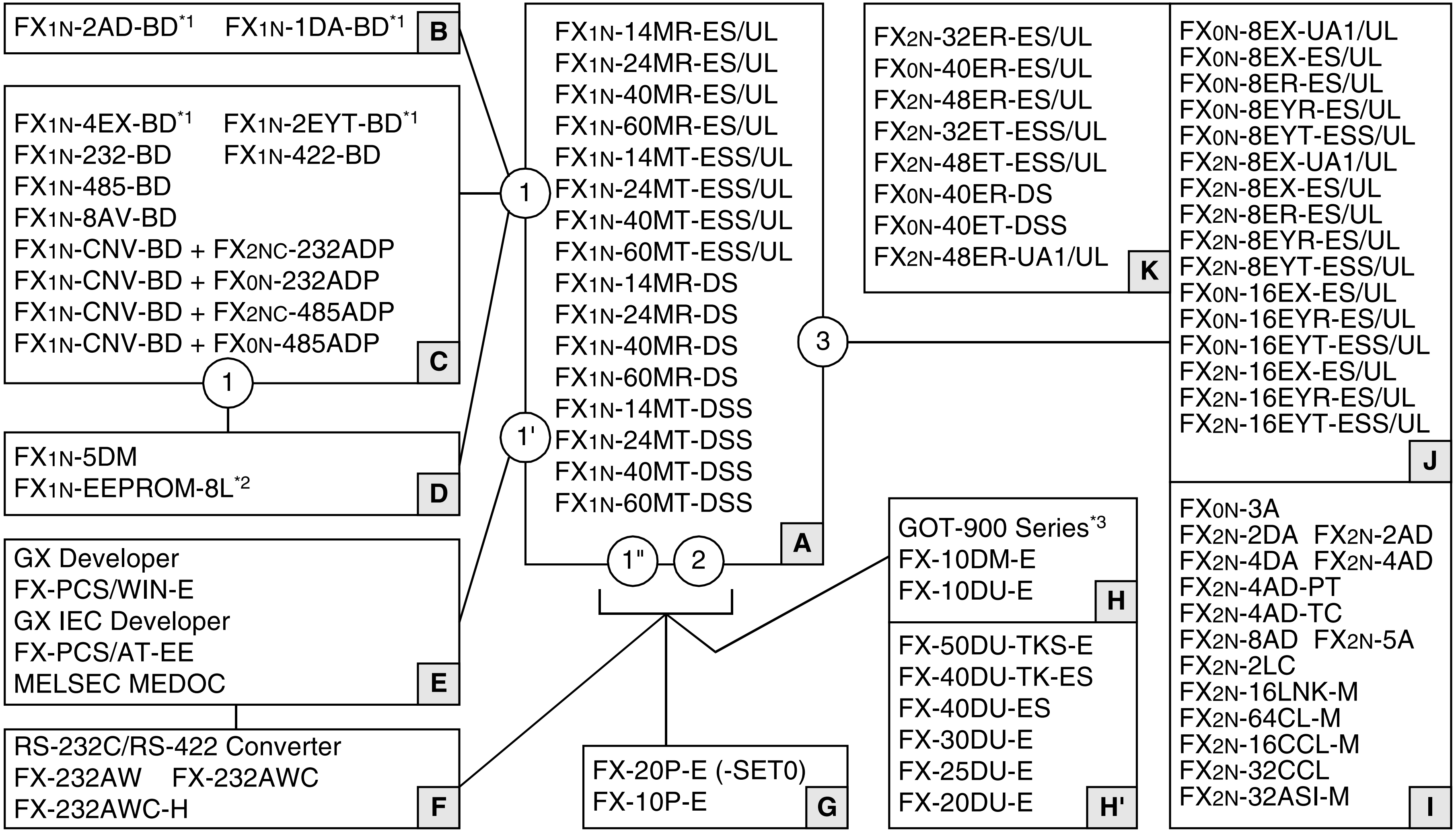
3)

Table 1.8 : Notes on serial numbers

1)	Production year
2)	Production month
3)	Production serial number

1.4 Configuration

1.4.1 Schematic system



*1 Available for use with FX_{1N} version 2.00 or later.

*2 When using the FX_{1N}-EEPROM-8L with an expansion board in group C, only the loader function (transfer program) can be used. Remove it from the PLC after operating the loader function and attach the top cover into the PLC.

*3 GOT-F900 Series can connect via an FX_{1N}-232-BD to the FX_{1N} PLC.

*4 When supplying 24V DC power source to the FX_{1N} main unit, only the FX_{0N} series powered extension unit (DC power supply type) can connect.
When supplying 12V DC power source to the FX_{1N} main unit, the powered extension unit and special function blocks cannot connect to it.

*5 FX_{1N} series PLC cannot connect together with an FX_{2N}-32ASI-M and FX_{2N}-16CCL-M.
An FX_{2N}-32ASI-M module cannot be attached to an FX_{1N} series PLC that is using an FX_{2N}-16CCL-M module. Only one FX_{2N}-32ASI-M module can be connected to the PLC.

Table 1.9 : Configuration Notes

A	FX1N Series Main Unit
B	FX1N Expansion Boards for Analog I/O
C	FX1N Expansion Boards without Analog I/O
D	Memory Cassette or Display Module
E	Programming Software
F	RS-232C/RS-422 Converter for PC
G	Dedicated Programming Tools

H	HMI Devices (GOT-F900/ GOT-A900/ DM/ DU) <GOT: Graphic Operation Terminal, DM: Display Module, DU: Data access Unit>
H’	DU Series (Discontinued since Sept. 2002)
I	Powered Extension Units
J	Extension Blocks
K	Special Function Blocks

Table 1.10: Connection Ports

1	Left hand side port
1'	Left hand side port + FX1N-232-BD or Left hand side port + FX1N-CNV-BD + FX2NC-232ADP or Left hand side port + FX1N-CNV-BD + FX0N-232ADP

1"	Left hand side port + FX1N-422-BD
2	Programming Port
3	Extension Bus Port

1.4.2 Note for Using Expansion Board

STOP

The following conditions cannot be accomplished with an FX1S PLC.

- FX1N-422-BD + FX-2PIF
- FX1N-5DM + FX1N-422-BD + FX-10DM
- FX-10DM + FX1N-422-BD + FX-10DM
- Connect two Programming tools (FX-10P-E, FX-20P-E, Programming software, etc.)
- The use of Special function Blocks

Caution

Connect a programming tool (such as an FX-10P-E, FX-20P-E and personal computer) to either the connector built in to the PLC or the connector on the FX1N-422-BD or FX1N-232-BD. If a programming tool is connected to both connectors, the program stored in the PLC may not match the program stored in the programming tool. If the program is changed or the set value of timers or counters are changed with this configuration, the program may be partially overwritten and the PLC may malfunction.

1.4.3 Input/Output Points and Current Consumption

The following tables show the input/output points of various types of FX0N and FX2N series extension blocks, and special function blocks, along with the special function block current consumption.

Table 1.11: Extension blocks

MODEL	INPUT X	OUTPUT Y	TOTAL
FX0N-8ER-ES/UL FX2N-8ER-ES/UL	4(8)	4(8)	16*1
FX0N-8EX-ES/UL FX2N-8EX-ES/UL	8	-	8
FX0N-8EX-UA1/UL FX2N-8EX-UA1/UL	8	-	8
FX0N-8EYR-ES/UL FX2N-8EYR-ES/UL	-	8	8

MODEL	INPUT X	OUTPUT Y	TOTAL
FX0N-8EYT-ESS/UL FX2N-8EYT-ESS/UL	-	8	8
FX0N-16EX-ES/UL	16	-	16
FX0N-16EYT-ESS/UL	-	16	16
FX0N-16EYR-ES/UL	-	16	16
FX2N-16EX-ES/UL	16	-	16
FX2N-16EYR-ES/UL	-	16	16
FX2N-16EYT-ESS/UL	-	16	16

*1 8 points are used for actual input/output, however, this block should occupy 16 input/output points.

Table 1.12: Special function block/Function adapters/Expansion board

MODEL	CURRENT CONSUMPTION			INPUT		OUTPUT	TOTAL
	INTERNAL 5V DC	INTERNAL 24V DC	EXTERNAL 24V DC	X	X/Y	Y	
FX0N-3A	30mA	90mA	-	-	8	-	8
FX2N-5A	70mA	-	90mA	-	8	-	8
FX2N-2DA	30mA	85mA	-	-	8	-	8
FX2N-2AD	20mA	50mA	-	-	8	-	8
FX2N-4AD	30mA	-	55mA	-	8	-	8
FX2N-4DA	30mA	-	200mA	-	8	-	8
FX2N-4AD-PT	30mA	-	50mA	-	8	-	8
FX2N-4AD-TC	30mA	-	50mA	-	8	-	8
FX2N-8AD	50mA	-	80mA	-	8	-	8
FX2N-2LC	70mA	-	55mA	-	8	-	8
FX2N-16CCL-M*1	Self supplied	-	150mA	*2			*2
FX2N-32CCL	130mA	-	50mA	-	8	-	8
FX2N-64CL-M	190mA	-	25mA*3	*3			*3
FX2N-16LNK-M	200mA	-	90mA	*4			*4
FX2N-32ASI-M*1	150mA	-	70mA*5	*6			*6
FX0N-232ADP	200mA	-	-	-	-	-	-
FX0N-485ADP	30mA	-	50mA	-	-	-	-

Table 1.12: Special function block/Function adapters/Expansion board

MODEL	CURRENT CONSUMPTION			INPUT	OUTPUT		TOTAL
	INTERNAL 5V DC	INTERNAL 24V DC	EXTERNAL 24V DC	X	X/Y	Y	
FX2NC-232ADP	100mA	-	-	-	-	-	-
FX2NC-485ADP	150mA	-	-	-	-	-	-
FX1N-4EX-BD	-	-	25mA	-	-	-	-
FX1N-2EYT-BD	-	-	-	-	-	-	-
FX1N-2AD-BD	-	-	-	-	-	-	-
FX1N-1DA-BD	-	-	-	-	-	-	-
FX1N-232-BD	20mA	-	-	-	-	-	-
FX1N-422-BD	120~220mA	-	-	-	-	-	-
FX1N-485-BD	60mA	-	-	-	-	-	-
FX1N-8AV-BD	-	-	-	-	-	-	-
FX1N-CNV-BD	-	-	-	-	-	-	-

*1 FX1N series PLC cannot connect together with an FX2N-32ASI-M and FX2N-16CCL-M. An FX2N-32ASI-M module cannot be attached to an FX1N series PLC that is using an FX2N-16CCL-M module. Only one FX2N-32ASI-M module can be connected to the PLC.

*2 Maximum number of I/O points per system Connection is allowed as far as the following condition is satisfied:
(Actual number of I/O points of PLC) + (Number of points occupied by special extension blocks) + (Number of points occupied by FX_{2N}-16CCL-M: 8) + (32 x Number of remote I/O modules) $\leq$ 128
Moreover, if connecting two or more FX_{2N}-16CCL-M, the first master module can connect to the “remote I/O modules” and “remote device modules” but subsequent modules only connect to “remote device modules”.

*3 For details, refer to FX_{2N}-64CL-M User’s Manual.

*4 The value depends on the switch setting (16, 32, 48, 64, 96 or 128 points).

*5 FX_{2N}-32ASI-M must be supplied 70mA (at Typical 30.5V) from the AS-interface power supply.

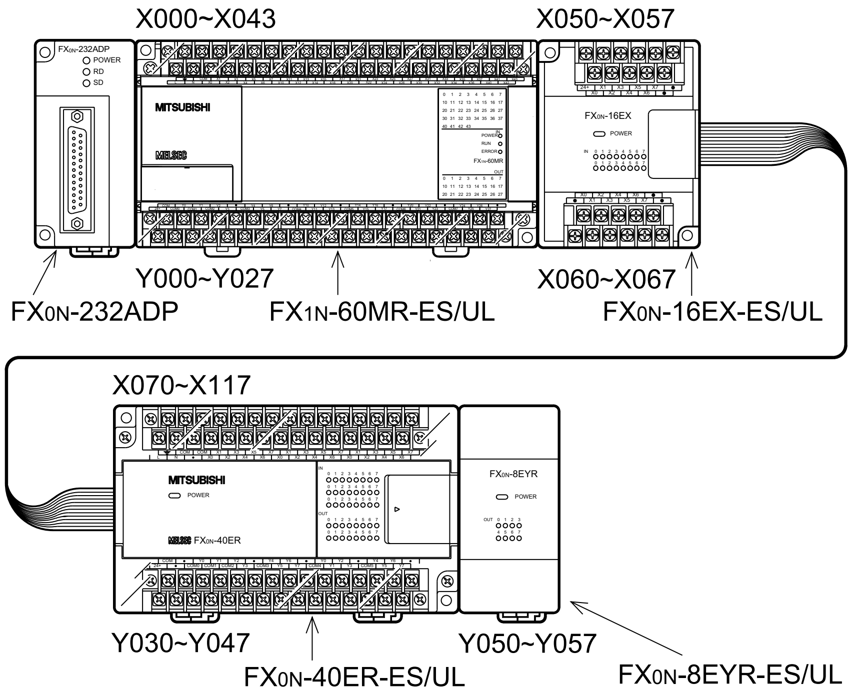
*6 The I/O control points of both the FX_{2N}-32ASI-M and PLC CPU must not exceed 128 points. Therefore, there is a limitation in the number of units (number of slaves) which can be controlled according to the I/O points recognized by the PLC's CPU (occupation).
Occupation I/O points: Each AS- i slave station occupies 4 CPU I/ O points.

1.4.4 Rules of Expansion

The maximum I/O for an FX1N system is 128 I/O points and 8 special function blocks.
The FX1N Series can be expanded as follows when used independently.

- 2 special function blocks
- 1 special function block and up to 16 I/O points
- Up to 32 I/O points

It can also be expanded to 4 special function blocks when used in conjunction with an FX0N extension unit (2+2). An AC powered FX1N can be expanded by 8 special function blocks when used in conjunction with an FX2N extension unit (2+6).



- FX1N series PLC cannot connect together with an FX2N-32ASI-M and FX2N-16CCL-M.
  An FX2N-32ASI-M module cannot be attached to an FX1N series PLC that is using an FX2N-16CCL-M module.
  Only one FX2N-32ASI-M module can be connected to the PLC.
- If connecting two or more FX2N-16CCL-M, the first master module can connect to the “remote I/O modules” and “remote device modules” but subsequent modules only connect to “remote device modules”.

- If a DC powered main unit is used with a power supply of less than 24VDC -15% (20.4V DC or less), then it **cannot** be fully expanded by using special function blocks or powered extension units.
  It can accommodate a maximum of an additional 32 I/O points.

- If an FX_{1N} expansion board is being used, it does not alter the rules of expansion outlined above, as it utilizes special M coils for its operation and therefore does not contribute to the maximum 128 I/O point count. Only one special function board can be used at any time. See section 3.9.1 for more details.

1.5 Back up Data

1.5.1 EEPROM backup

Data includes the Program, Comment, File Registers (D1000 ~ D7999), and parameter data. This will be stored as long as the EEPROM is not damaged. Mitsubishi Electric has guaranteed a life cycle time of 10,000 writes to the EEPROM memory. Users may experience operational writes to the EEPROM in excess of 10,000; however, due to temperature effects a quantitative estimation cannot be given.

If the PLC has been powered on for five minutes or more, the following device data will be saved in the EEPROM at powerdown:
S0 ~ S127, M384 ~ M511, C16 ~ C31, C235 ~ C255, and D128 ~ D255.

1.5.2 Capacitor backup

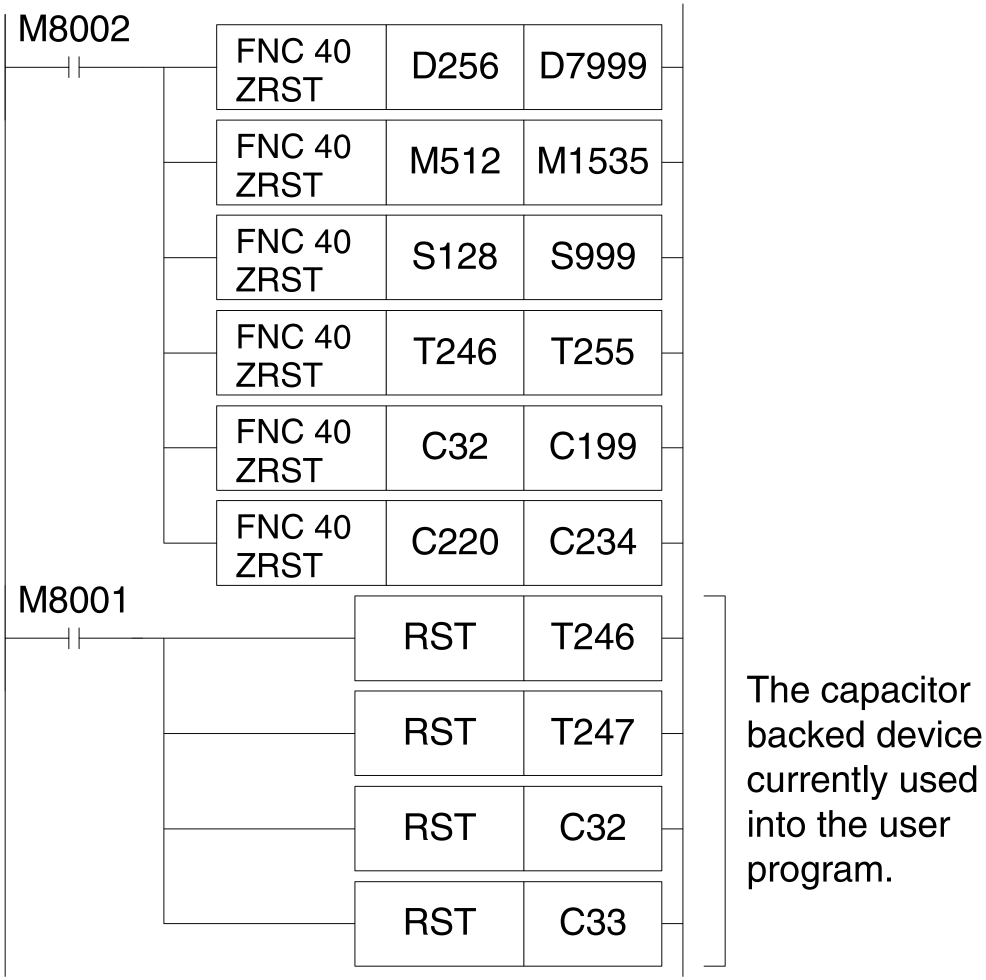
The capacitor backed memory includes M512 ~ M1535, S128 ~ S999, T246 ~ T255, C32 ~ C199, C220 ~ C234, D256 ~ D7999 and the RTC.

The capacitor backed memory will retain data for a maximum of 10 days (Ambient temperature: 25 °C), and requires 30 minutes to recharge upon power up.

Note: The FX_{1N} does not have battery backup, if a system requires backup of more than 10 days (Ambient temperature: 25 °C), a peripheral backup power source must be provided.

Warning

If the PLC will be intentionally powered down for a duration exceeding 10days (Ambient temperature: 25 °C), then please include the following code into the user program as the supercapcitor backed area of memory will be unfixed.



The device data held by the supercapcitor will not be reset to 0 as there is NO internal hardware reset function.
However, initialization method by the ZRST instruction, for capacitor backed devices (T246 ~ T255, C32 ~ C199, C220 ~ C234) can not be initialized. In order to initialize the condition of the reset coil, execute in OFF the RST instruction of the corresponding device currently used into the user program as shown in the example program on the left.

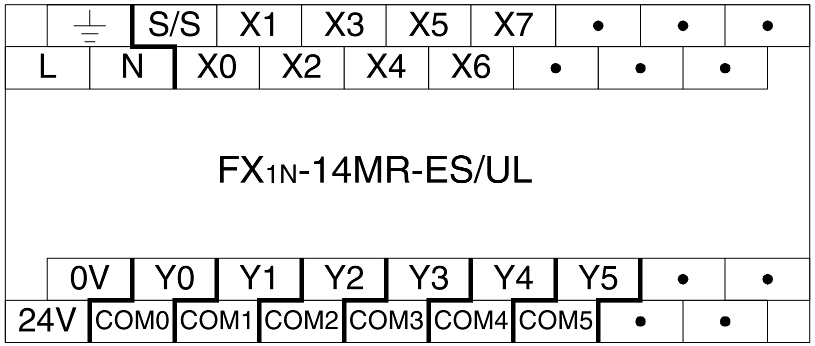
MEMO

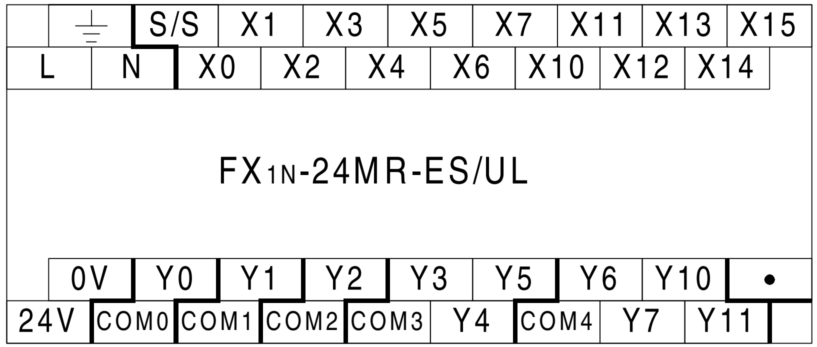
1
2
3
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5
6
7

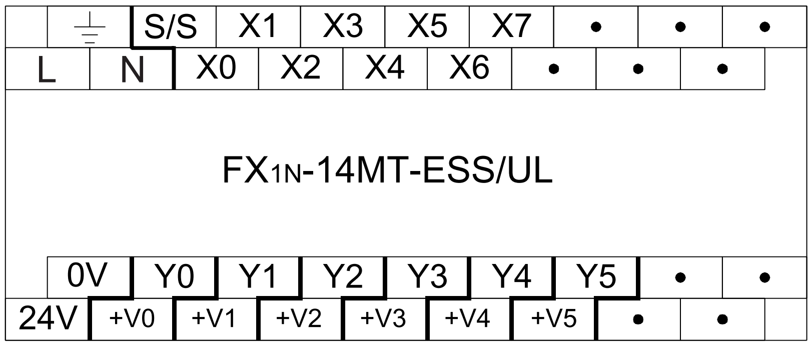
2. Terminal layouts

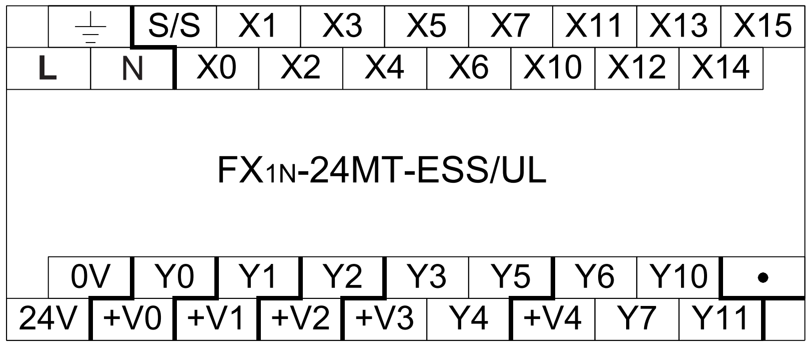
The following selection of terminal layouts are taken from the FX1N product range.
Note: All layouts are schematic only and are intended to aid the creation of wiring diagrams.

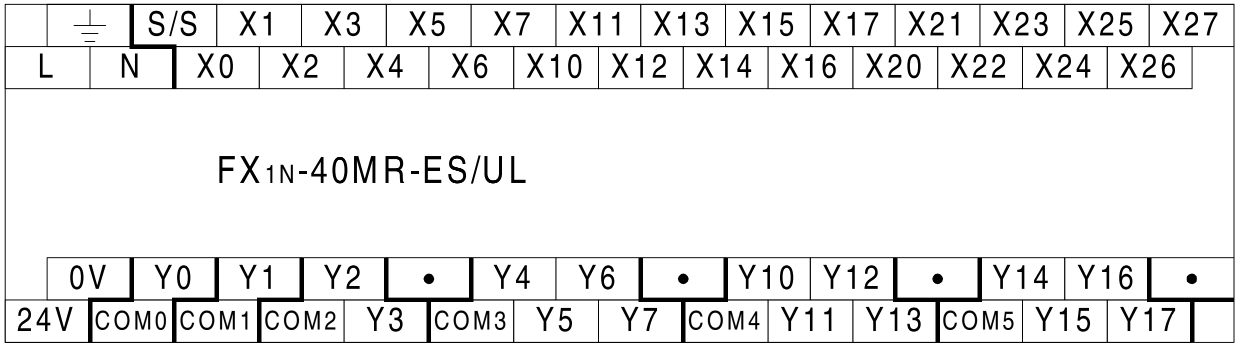
2.1 AC Powered Main Units

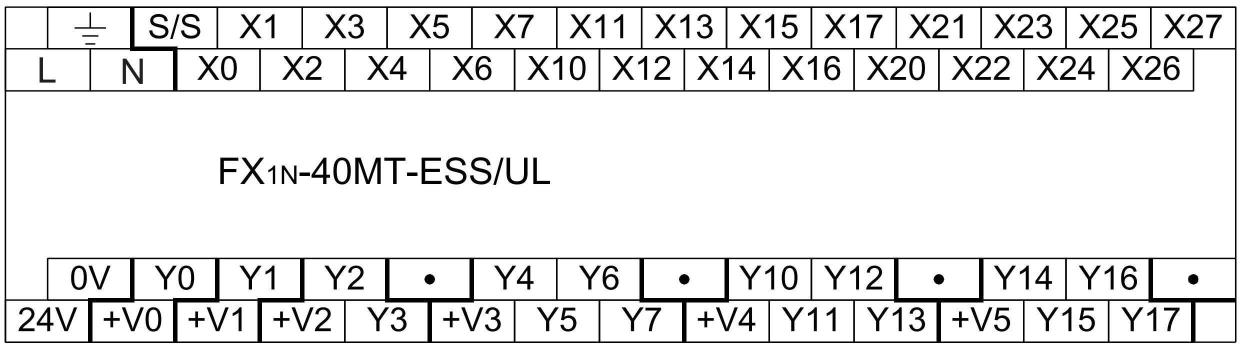









S/S X1 X3 X5 X7 X11 X13 X15 X17 X21 X23 X25 X27
L N X0 X2 X4 X6 X10 X12 X14 X16 X20 X22 X24 X26
FX1N-40MR-ES/UL
0V Y0 Y1 Y2 • Y4 Y6 • Y10 Y12 • Y14 Y16 •
24V COM0 COM1 COM2 Y3 COM3 Y5 Y7 COM4 Y11 Y13 COM5 Y15 Y17


S/S X1 X3 X5 X7 X11 X13 X15 X17 X21 X23 X25 X27
L N X0 X2 X4 X6 X10 X12 X14 X16 X20 X22 X24 X26
FX1N-40MT-ESS/UL
0V Y0 Y1 Y2 • Y4 Y6 • Y10 Y12 • Y14 Y16 •
24V +V0 +V1 +V2 Y3 +V3 Y5 Y7 +V4 Y11 Y13 +V5 Y15 Y17

	⏚	S/S	X1	X3	X5	X7	X11	X13	X15	X17	X21	X23	X25	X27	X31	X33	X35	X37	X41	X43
L	N	X0	X2	X4	X6	X10	X12	X14	X16	X20	X22	X24	X26	X30	X32	X34	X36	X40	X42	

FX1N-60MR-ES/UL

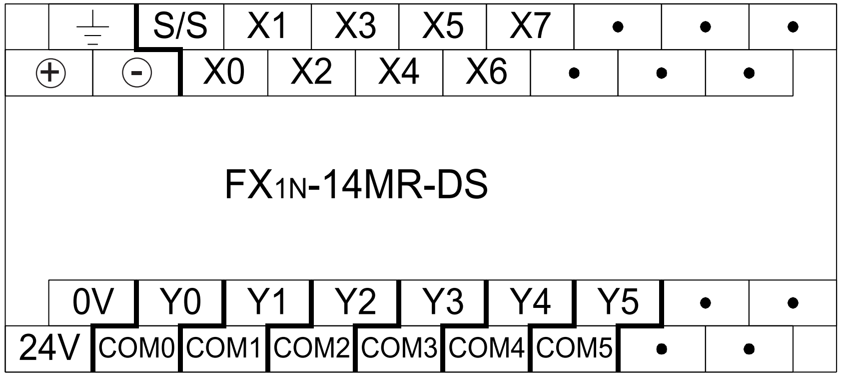
	0V	Y0	Y1	Y2	•	Y4	Y6	•	Y10	Y12	•	Y14	Y16	•	Y20	Y22	•	Y24	Y26	•
24V	COM0	COM1	COM2	Y3	COM3	Y5	Y7	COM4	Y11	Y13	COM5	Y15	Y17	COM6	Y21	Y23	COM7	Y25	Y27	

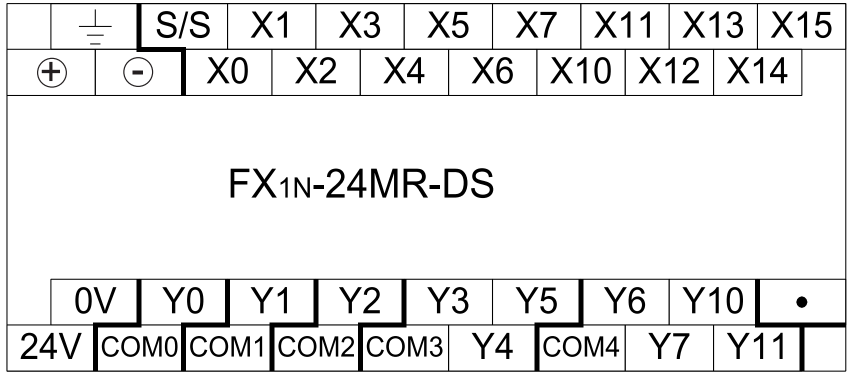
	⏚	S/S	X1	X3	X5	X7	X11	X13	X15	X17	X21	X23	X25	X27	X31	X33	X35	X37	X41	X43
L	N	X0	X2	X4	X6	X10	X12	X14	X16	X20	X22	X24	X26	X30	X32	X34	X36	X40	X42	

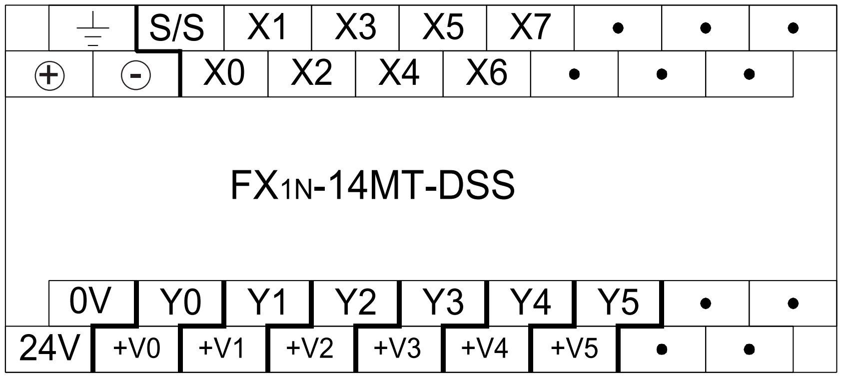
FX1N-60MT-ESS/UL

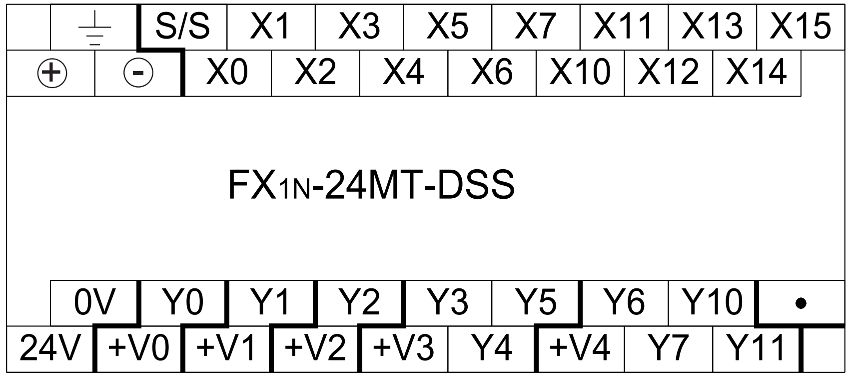
	0V	Y0	Y1	Y2	•	Y4	Y6	•	Y10	Y12	•	Y14	Y16	•	Y20	Y22	•	Y24	Y26	•
24V	+V0	+V1	+V2	Y3	+V3	Y5	Y7	+V4	Y11	Y13	+V5	Y15	Y17	+V6	Y21	Y23	+V7	Y25	Y27	

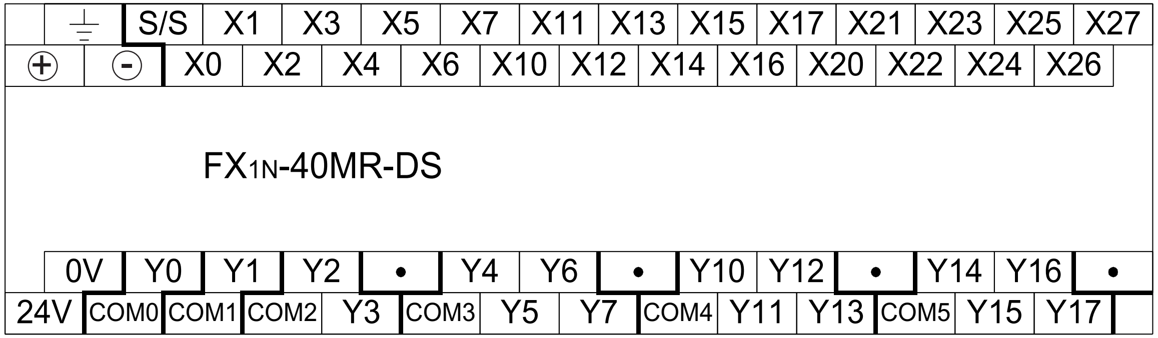
2.2 DC Powered Main Units

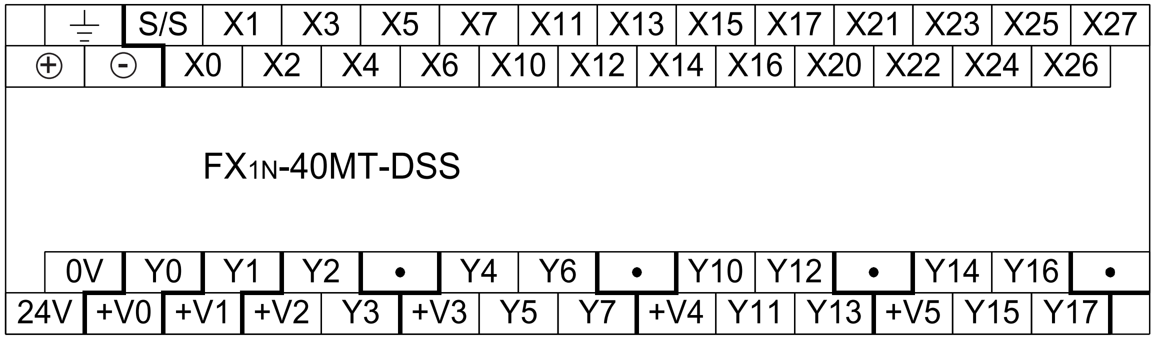


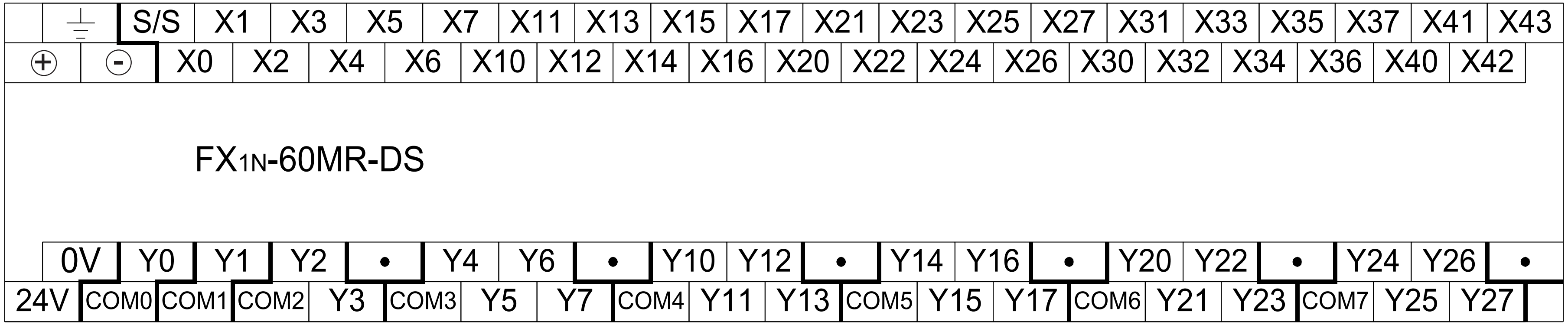


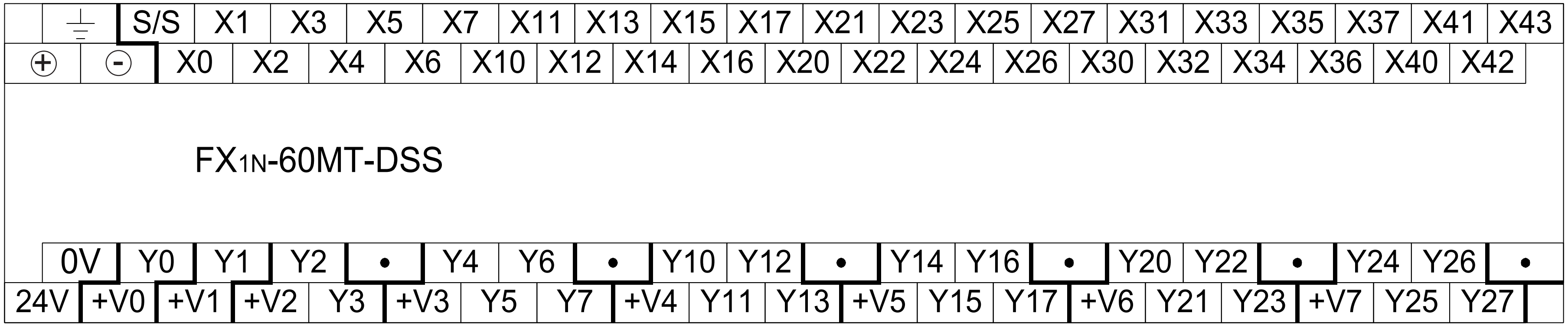




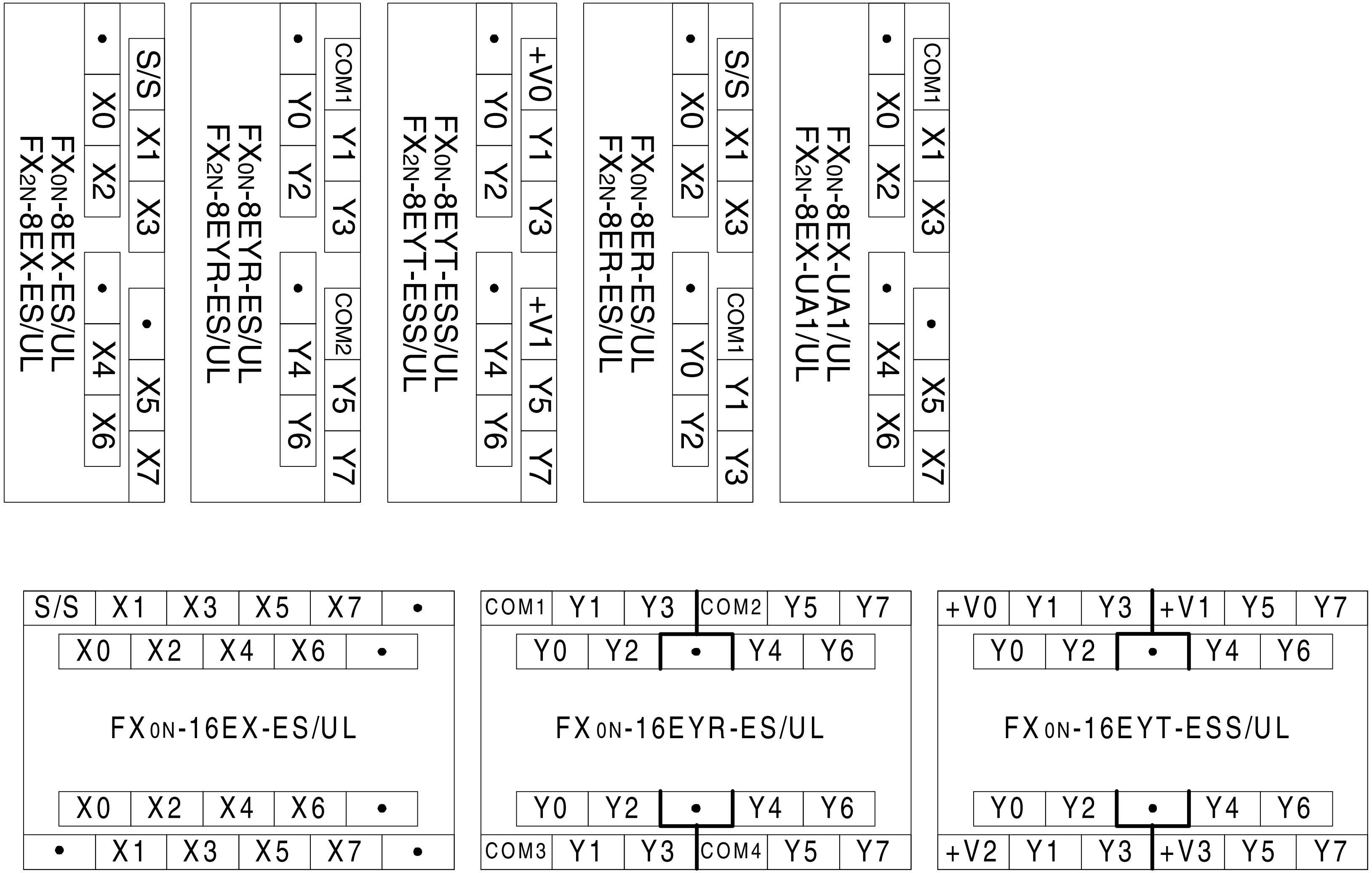

S/S X1 X3 X5 X7 X11 X13 X15 X17 X21 X23 X25 X27
⊕ ⊖ X0 X2 X4 X6 X10 X12 X14 X16 X20 X22 X24 X26
FX1N-40MR-DS
0V Y0 Y1 Y2 • Y4 Y6 • Y10 Y12 • Y14 Y16 •
24V COM0 COM1 COM2 Y3 COM3 Y5 Y7 COM4 Y11 Y13 COM5 Y15 Y17


S/S X1 X3 X5 X7 X11 X13 X15 X17 X21 X23 X25 X27
⊕ ⊖ X0 X2 X4 X6 X10 X12 X14 X16 X20 X22 X24 X26
FX1N-40MT-DSS
0V Y0 Y1 Y2 • Y4 Y6 • Y10 Y12 • Y14 Y16 •
24V +V0 +V1 +V2 Y3 +V3 Y5 Y7 +V4 Y11 Y13 +V5 Y15 Y17

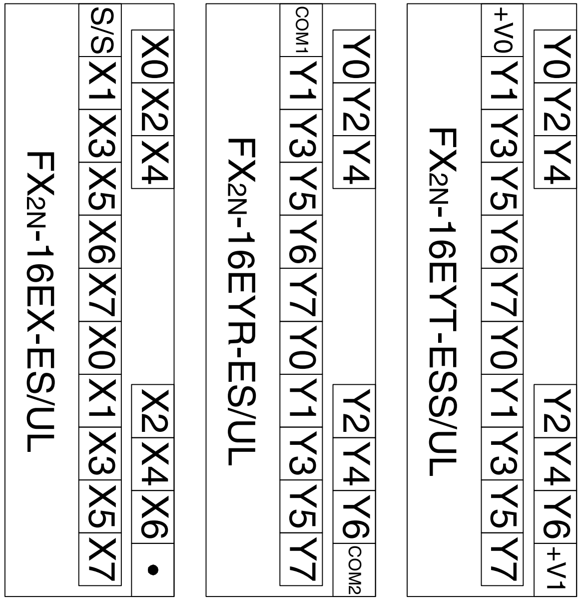

⏚ S/S X1 X3 X5 X7 X11 X13 X15 X17 X21 X23 X25 X27 X31 X33 X35 X37 X41 X43
⊕ ⊖ X0 X2 X4 X6 X10 X12 X14 X16 X20 X22 X24 X26 X30 X32 X34 X36 X40 X42
FX1N-60MR-DS
0V Y0 Y1 Y2 • Y4 Y6 • Y10 Y12 • Y14 Y16 • Y20 Y22 • Y24 Y26 •
24V COM0 COM1 COM2 Y3 COM3 Y5 Y7 COM4 Y11 Y13 COM5 Y15 Y17 COM6 Y21 Y23 COM7 Y25 Y27


⏚ S/S X1 X3 X5 X7 X11 X13 X15 X17 X21 X23 X25 X27 X31 X33 X35 X37 X41 X43
⊕ ⊖ X0 X2 X4 X6 X10 X12 X14 X16 X20 X22 X24 X26 X30 X32 X34 X36 X40 X42
FX1N-60MT-DSS
0V Y0 Y1 Y2 • Y4 Y6 • Y10 Y12 • Y14 Y16 • Y20 Y22 • Y24 Y26 •
24V +V0 +V1 +V2 Y3 +V3 Y5 Y7 +V4 Y11 Y13 +V5 Y15 Y17 +V6 Y21 Y23 +V7 Y25 Y27

2.3 FX0N, FX2N-8E Extension blocks



2.4 FX2N Extension blocks

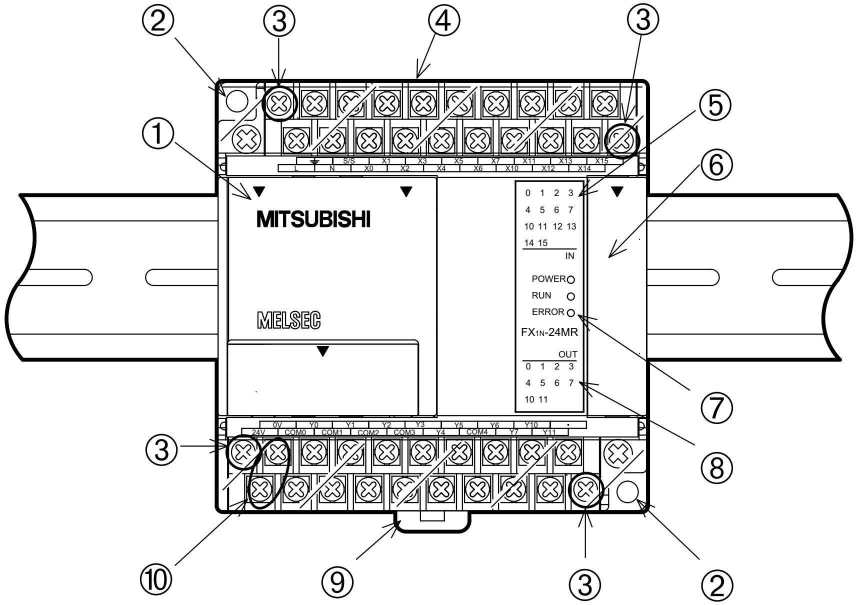


3. Installation Notes

The installation of FX1N products has been designed to be safe and easy. When the products associated with this manual are used as a system or individually, they must be installed in a suitable enclosure. The enclosure should be selected and installed in accordance to the local and national standards.

3.1 Product Outline

Figure 3.1:Features of the FX1N PLC



Top cover removed

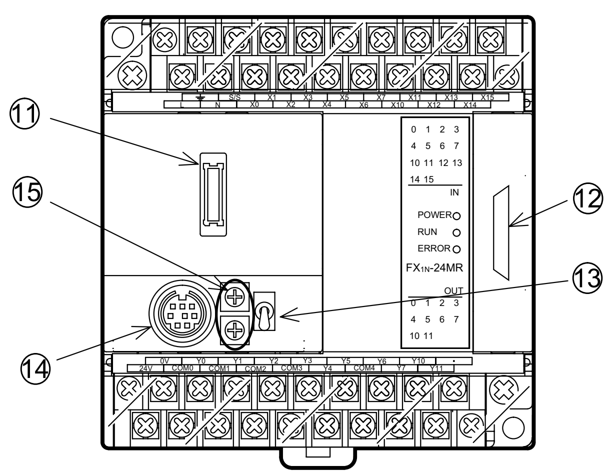


Table 3.1 : Features table

1	Top cover
2	Direct mounting holes (4.5 mm <0.17"> diameter)
3	I/O terminal block securing screws
4	Input terminals (24V DC) and power supply terminals
5	Input LED status indicators
6	Expansion port cover
7	PLC status indicators (POWER, RUN, ERROR)
8	Output LED status indicators
9	DIN rail mounting clip
10	Output terminals and power supply source terminals
11	Optional equipment connector
12	Expansion port
13	Run/Stop switch
14	Programming port
15	Variable analog potentiometers. Upper pot, D8030 read from VR1. Lower pot D8031 read from VR2

3.2 FX1N RUN/STOP Control

RUN or STOP of the FX1N can be controlled by:

❶The RUN/STOP switch mounted next to the programming port.

❷A standard input (X0 to X17) defined by the system parameters.

❸Remotely from a personal computer or other programming peripheral.

Note: The FX1N RUN/STOP switch works in parallel with the RUN-input terminal. Please refer to the table below.
During remote operation the FX1N RUN/STOP status is determined by the most recently operated control.
E.g. If the RUN/STOP switch is in RUN and a remote STOP is made from a personal computer the RUN/STOP switch must be switched to STOP then back to RUN to switch the MPU back to RUN mode.

Figure 3.2:RUN input terminal

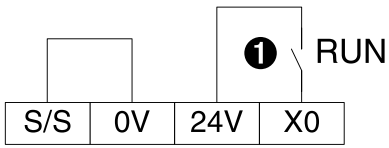


Table 3.2 : RUN/STOP selection

RUN/STOP SWITCH	❶ RUN INPUT TERMINAL	FX1N MPU STATUS
✔	✔	RUN
✔	✘	RUN
✘	✘	STOP
✘	✔	RUN

3.3 General Specifications

Item	Description
Operating Temperature	0 to 55 °C (32 to 131 °F)
Storage Temperature	-20 to 70 °C (-4 to 158 °F)
Operating Humidity	35 to 85% Relative Humidity, No condensation
storage Humidity	35 to 90% Relative Humidity, No condensation
Vibration Resistance - Direct Mounting	Conforms to EN 68-2-6; 10 - 57 Hz: 0.075 mm Half Amplitude 57 - 150 Hz: 9.8 m/s^2 Acceleration Sweep Count for X, Y, Z: 10 times (80 min in each direction)
Vibration Resistance - DIN rail Mounting	Conforms to EN 68-2-6; 10 - 57 Hz: 0.035 mm Half Amplitude 57 -150 Hz: 4.9 m/s^2 Acceleration Sweep Count for X, Y, Z: 10 times (80 min in each direction)
Shock Resistance	Conforms to EN 68-2-27: 147m/s^2 Acceleration, Action Time: 11 ms 3 times in each direction X, Y, and Z
Noise Immunity	1000 Vp-p, 1microsecond, 30 - 100 Hz, tested by noise simulator
Dielectric Withstand Voltage	AC PSU: 1500 V AC > 1 min., tested between each terminal with ground terminal*1 DC PSU: 500 V AC > 1 min., tested between each terminal with ground terminal*1
Insulation Resistance	5 MΩ > at 500 V DC, tested between each terminal with ground terminal*1
Ground	Grounding resistance 100 Ω or less
Certification	UL/cUL (UL508)
EC Directive	EMC (EN61000-6-2, EN50081-2), LVD (EN61010-1)

*1 Perform dielectric withstand voltage and insulation resistance tests at the stated voltage between each terminal and the main unit’s ground terminal.

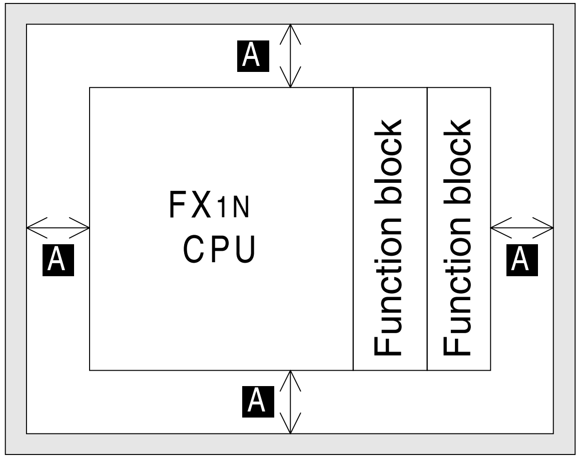
Between terminals	Dielectric strength		Insulation resistance	Remarks
	AC Power Supply Units	DC Power Supply Units		
Between power supply terminal and ground terminal	1.5kV AC for 1 min	500V AC for 1 min	5MΩ or more on 500V DC Megger	–
Between 24V DC service power supply connected to input terminal (24V DC) and ground terminal	500V AC for 1 min			–
Between input terminal (100V AC) and ground terminal	1.5kV AC for 1 min			–
Between output terminal (relay) and ground terminal	1.5kV AC for 1 min			–
Between output terminal (transistor) and ground terminal	500V AC for 1 min			–

3.4 PLC Mounting Arrangements

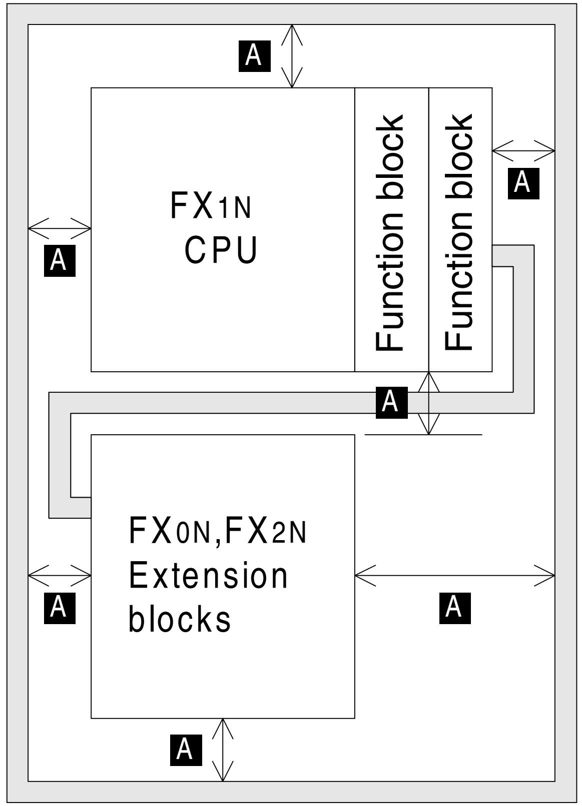
To prevent a rise in temperature, mount the units to walls. Never mount them to the floor or ceiling of an enclosure.

Below (left)Single row arrangement

Below (right)Double row arrangement using extension cable FX_{0N}-65EC (650mm (25.59”); supplied separately).



A > 50mm (1.97 inches)



A > 50mm (1.97 inches)

Caution

- Units should not be installed in areas subject to the following conditions: excessive or conductive dust, corrosive gas (salt air, Cl_2, H_2S, SO_2, NO_2, etc.) or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration.
- Take special care not to allow debris to fall inside the unit during installation e.g. cut wires, shavings etc. Once installation is complete remove the protective paper band, to prevent overheating.
- Always ensure that mounted units and blocks are kept as far away as possible from high-voltage cables, high-voltage equipment and power equipment.
- Do not lay signal cables near high voltage power cabling or cabinet housing along the same trunking duct. Effects of noise or surge induction may occur. Keep signal cables of more than 100 mm (3.94") away from these power cables.
- Install necessary power supply cut off precautions to the enclosure of the final system. Attach a warning label (hazard symbol 417-IEC-5036) concerning electric shock to the enclosure.
- Use the FX1N series PLC with consideration for electrical noise in an environment that does not exceed conditions provided by EN50081-2 and EN61000-6-2.
- Cut off all phases from the power source before installation or performing wiring work to avoid electric shock. Incorrect operation can lead to serious damage to the product.
- Cut off all phases from the power source before installing/removing extension or communication cables to modules to avoid electric shock, incorrect operation or serious damage to the product.

- Replace the terminal cover provided, after installation or wiring work is completed, and before supplying power and operating the unit to avoid electric shock.
- After reading the manual's safety instructions, initiate the operation for making program changes while the PLC is in RUN mode, forcing ON/OFF and switching RUN/STOP.
- The power supply of the extension units/blocks and the special function units/blocks should be started at the same time or earlier than the FX1N Series main unit.
- DO NOT use the "●" terminal in PLC.
- When using an incorrect power source or performing incorrect operation, serious damage will occur regardless of the level of the voltage and frequency.
- When performing incorrect wiring or operation, serious damage will occur.
- The "L" and "N" terminals are not reversible.
  If the "L" and "N" terminals are reversed, the units/blocks may be seriously damaged.
- The "24V" and "0V" terminals are not reversible.
  If the "24V" and "0V" terminals are reversed, the units/blocks may be seriously damaged.
- During transportation avoid any impact as the PLC is a precision instrument.
  It is necessary to check the operation of PLC after transportation, in case of any impact damage.
- When storing the PLC, conform to the environmental conditions specified by the general specification.

3.5 DIN Rail Mounting

Units can be snap mounted to 35mm (1.37") DIN rail (DIN EN 50022). To release, pull the spring loaded clips away from the rail and slide the unit up and off.

3.6 Direct Mounting

Table 3.3 :Hole positions

UNIT		mm ± 0.2	inches ± 0.01
		A = W-8mm (0.32")	
FX1N-14M☆	2-∅ (→)	82	3.23
FX1N-24M☆		82	3.23
FX1N-40M☆		122	4.81
FX1N-60M☆		167	6.58
		B = W-10mm (0.40")	
FX0N-40E☆	2-∅ (→)	140	5.52
FX2N-32E☆		140	5.52
FX2N-48E☆	4-∅ (→)	172	6.78
FX2N-48ER-UA1/UL		210	8.27

∅ = 4.5mm (0.17")

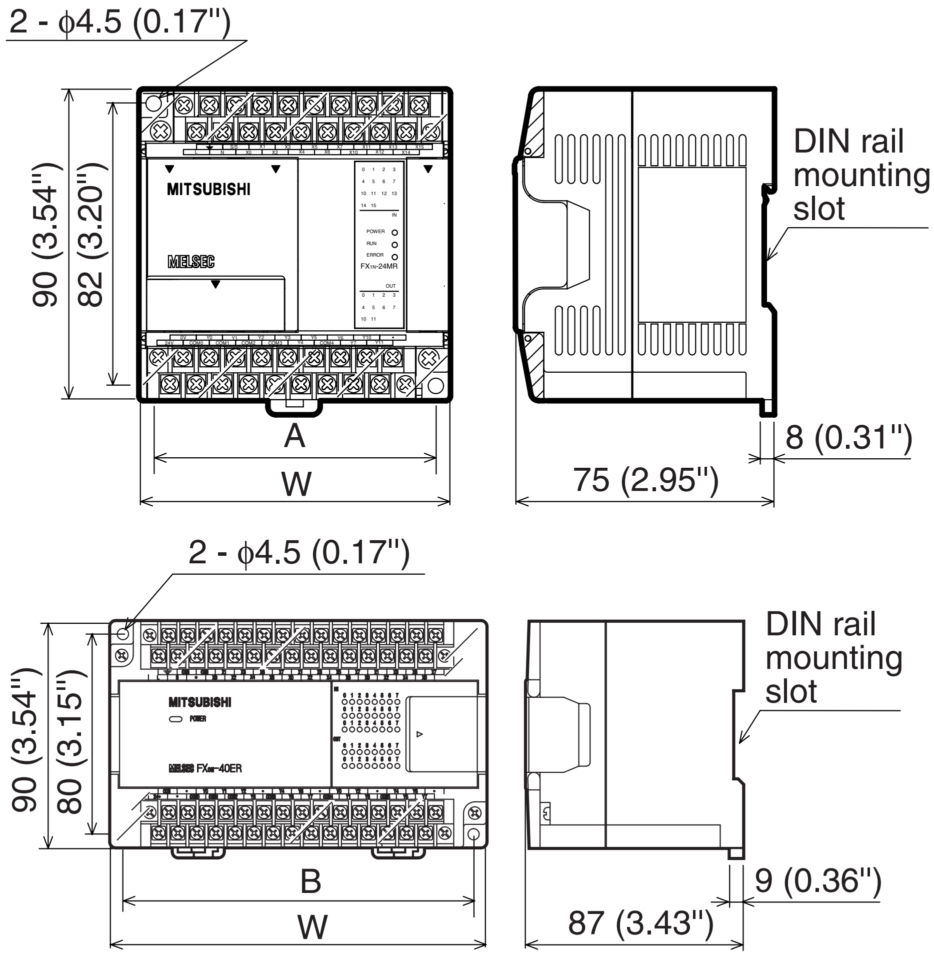


Table 3.3 :Hole positions

UNIT	mm ± 0.2	inches ± 0.01
	C = W/2	
FX2N-16E☆	20	0.79
	D = W	
FX0N-8E☆, FX2N-8E☆, FX0N-3A, FX2N-2AD, FX2N-2DA, FX2N-32CCL, FX2N-16LNK-M, FX2N-64CL-M, FX0N-232ADP, FX0N-485ADP	43	1.70
FX2N-4DA, FX2N-4AD FX2N-4AD-PT, FX2N-5A, FX2N-4AD-TC, FX2N-2LC, FX2N-32ASI-M	55	2.17

∅ = 4.5mm (0.17")

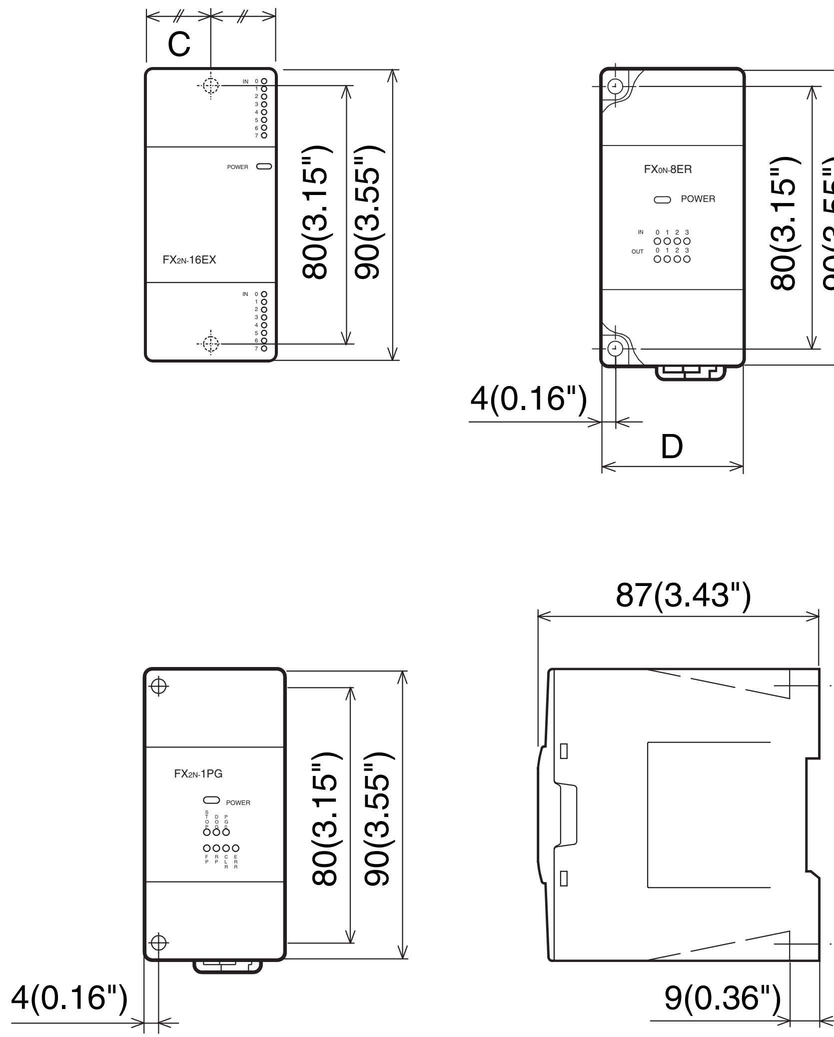
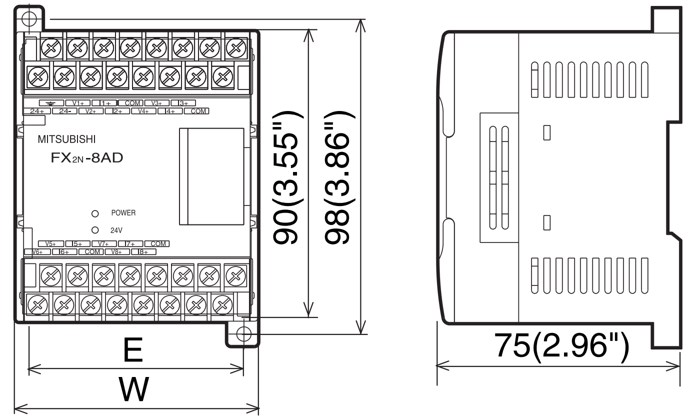


Table 3.3 :Hole positions

UNIT	mm ± 0.2	inches ± 0.01
	E = W-8mm (0.32")	
FX2N-8AD	67	2.64
	F = W-24.5mm (0.97")	
FX2NC-232ADP, FX2NC-485ADP	65.5	2.58

∅ = 4.5mm (0.17")



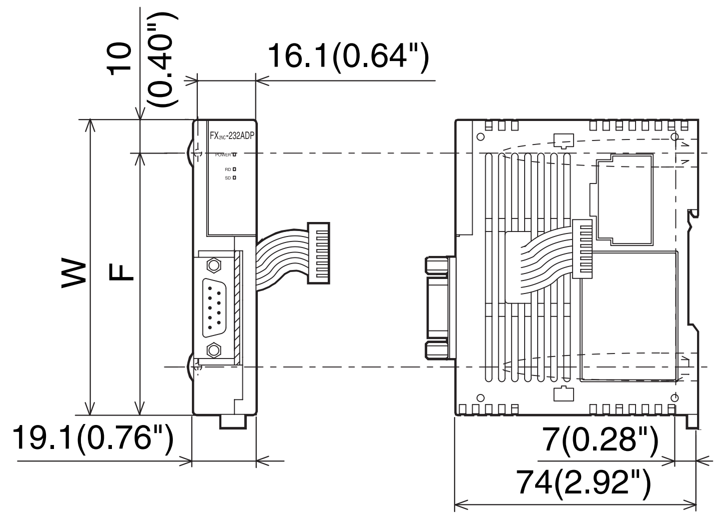
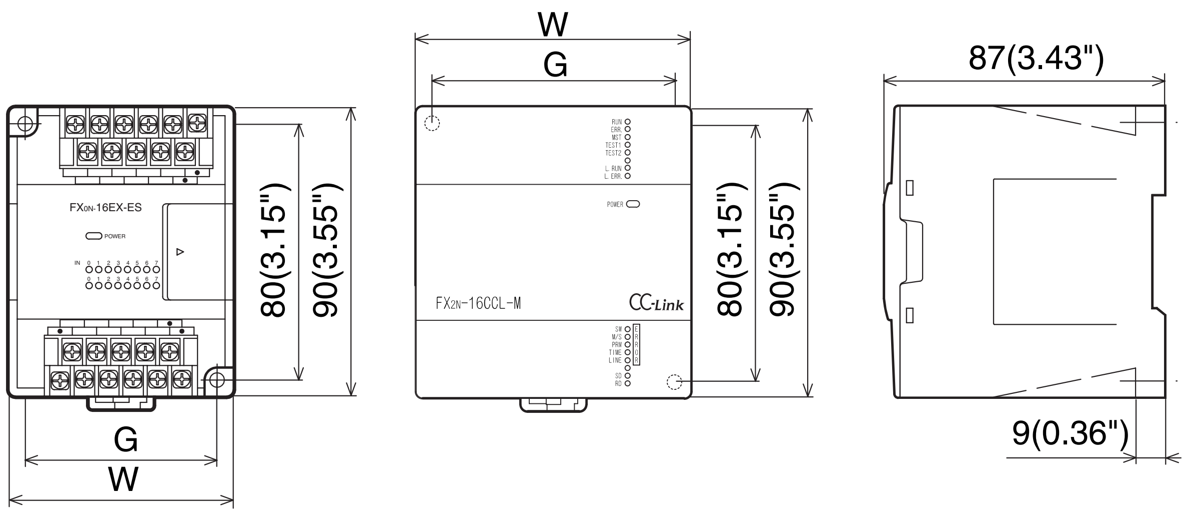


Table 3.3 :Hole positions

UNIT	mm ± 0.2	inches ± 0.01
	G = W-10mm (0.40")	
FX0N-16E☆	60	2.37
FX2N-16CCL-M	75	2.96

∅ = 4.5mm (0.17")



3.7 Termination at Screw Terminals

Terminal screws should be tightened to between 0.5 to 0.8 N·m. Terminal screws must be secured to prevent a loose connection thus avoiding a malfunction.
The terminal screws for the FX1N, FX0N, FX2N Series PLCs are M3.0. However, the terminal screws for the FX0N-32NT-DP and Terminal Blocks are M3.5. The crimp style terminal (see Figure 3.3, 3.4, 3.6 and 3.7) is suitable for use with these screws and should be fitted to the cable for wiring.
When installing 1 or 2 crimp terminals to a terminal, see explanation Figure 3.5 and 3.8. However, 3 crimp terminals or more should not be installed to a single terminal.

1) Handle the crimp terminal of the following size when 1 wire is used per terminal. Refer to Figure 3.5 for installation instructions.

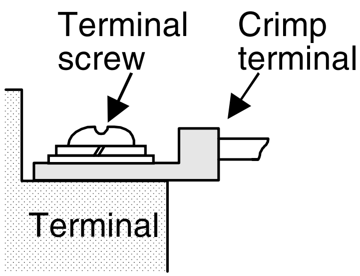
Figure 3.3:Crimp Terminal for M3.5 Screws



Figure 3.4:Crimp Terminal for M3 Screws



Figure 3.5:Installing 1 wire Per a Terminal



2) Handle the crimp terminal of the following size when 2 wires are used per terminal. Refer to Figure 3.8 for installation instructions.

Figure 3.6:Crimp Terminal for M3.5 Screws

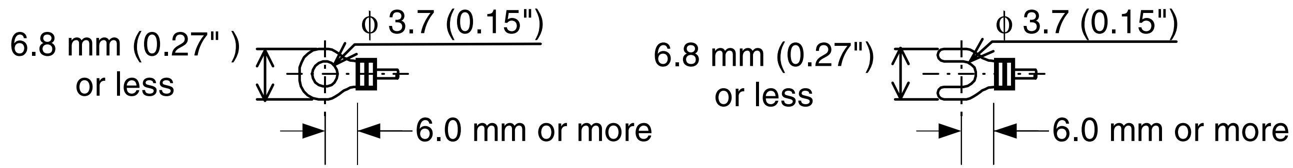


Figure 3.7:Crimp Terminal for M3 Screws

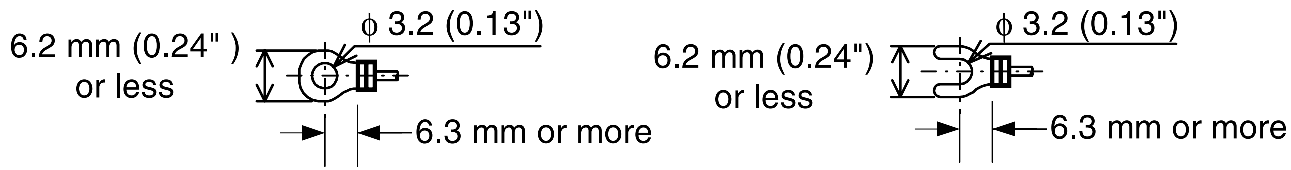
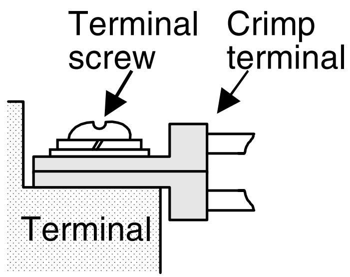


Figure 3.8:Installing 2 Wires Per a Terminal



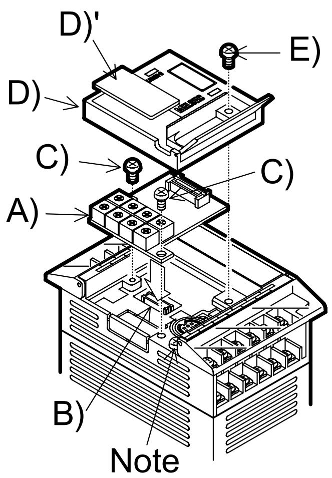
3.8 Installing Optional Units

3.8.1 Expansion Boards

The following is a generic explanation of how to install an expansion board on to the FX1N PLC. For greater detail, specifications and wiring examples for each optional unit, please see the relevant product manuals.

<table>
<tr><th>MODEL</th><th>USE WITH FX1N-5DM</th><th>USE WITH FX1N-EEPROM-8L</th></tr>
<tr><td>FX1N-232-BD</td><td>✔</td><td rowspan="7">Possible for program upload and download while the PLC is in the STOP mode.</td></tr>
<tr><td>FX1N-422-BD</td><td>✔</td></tr>
<tr><td>FX1N-485-BD</td><td>✔</td></tr>
<tr><td>FX1N-CNV-BD</td><td>✔</td></tr>
<tr><td>FX1N-8AV-BD</td><td>✔</td></tr>
<tr><td>FX1N-4EX-BD</td><td>✔</td></tr>
<tr><td>FX1N-2EYT-BD</td><td>✔</td></tr>
<tr><td>FX1N-2AD-BD</td><td>✘</td><td>✘</td></tr>
<tr><td>FX1N-1DA-BD</td><td>✘</td><td>✘</td></tr>
</table>

Always make sure the power is turned off, before installing a special function board. Only one board can be used at any one time, do not try to stack multiple boards.



A) Special function or optional equipment board.
B) Optional equipment connector port.
C) M3 screw to secure board.
D) Top cover for board.
E) M3 screw to secure top cover.
Note: Do not remove this screw.

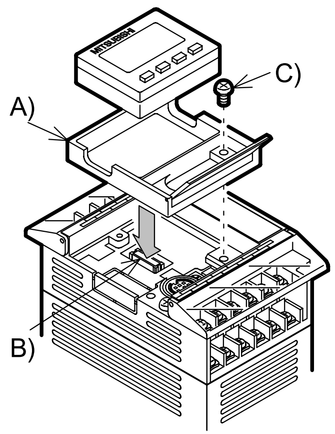
- Remove base unit top cover.
- Plug board A) into connector B).
- Fix board to base unit using screws C).
- Attach top cover for board D) removing section D)' to expose connector etc. (if applicable)
- Secure top cover with M3 screw E).

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7

3.8.2 FX1N-5DM Display Module

Always make sure the power is turned off, before installing the 5DM.

A) Top cover for DM
B) Optional equipment connector port.
C) M3 screw to secure top cover.



- Remove the base unit top cover.
- Attach the top cover for DM A), and secure with screw C) (if 5DM is to be permanently mounted)
- Plug in the 5DM at connector B)

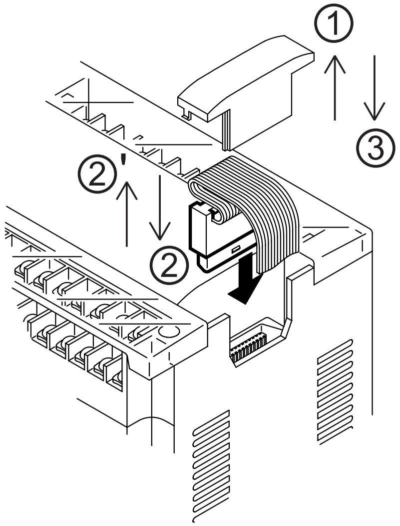
For further information please refer to the FX1N-5DM users manual.

3.8.3 Extension I/O module and Special Function module

Install/remove extension module as shown in the figure below.

Caution

Cut off all phases of power source before installing/removing the extension module.



Ref.	Description
1	Remove the extension bus cover.
2 or 2'	2: Install extension cable.
	2': Remove extension cable.
3	Install the extension bus cover.

1
2
3
4
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7

MEMO

4. Power Supply

4.1 Wiring Techniques

Wiring for FX1N products has been designed to be safe and easy. If the user is concerned about the correct installation of these products or associated products, please contact a professional electrician who is trained to the local and national standards applicable to the installation site.

4.2 Wiring Cautions

- Do not run input signals in the same multicore cable as output signals or allow them to share the same wire.
- Do not lay I/O signal cables next to power cables or allow them to share the same trunking duct. Low voltage cables should be reliably separated or insulated with regard to high voltage cabling.
- Where I/O signal lines are used over an extended distance consideration for voltage drop and noise interference should be made.

4.3 Power Supply

- When wiring an AC supply, the “Live” cable should be connected to the “L” terminal and the “Neutral” cable should be connected to the “N” terminal. Do NOT connect the “Live” wire to the “N” terminal, otherwise, the user may receive a dangerous shock upon powerup.
- When wiring a DC supply the “Live” cable should be connected to the “+” terminal and the “Neutral” cable should be connected to the “-” terminal. Do NOT connect the “Live” wire to the “-” terminal, otherwise, the user may receive a dangerous shock upon powerup.

4.4 Power Requirements

Table 4.1 :AC Power Supply Units

	FX1N-14M	FX1N-24M	FX1N-40M	FX1N-60M
Power supply	100 - 240V AC +10%, -15%, 50-60Hz			
Max. allowable momentary power failure period	10ms; if less than 10ms, the PLC will continue operation. If 10ms or more, the PLC will shut down			
Fuse (size) rating	250V 1A		250V 3.15A (3A)	
In-rush current	100V AC - Max. 30A for 5ms 200V AC - Max. 50A for 5ms			
Power consumption	29W *1	30W *1	32W *1	35W *1
24V DC Service Supply	400 mA			

*1 Includes the input current (5 or 7mA per point).

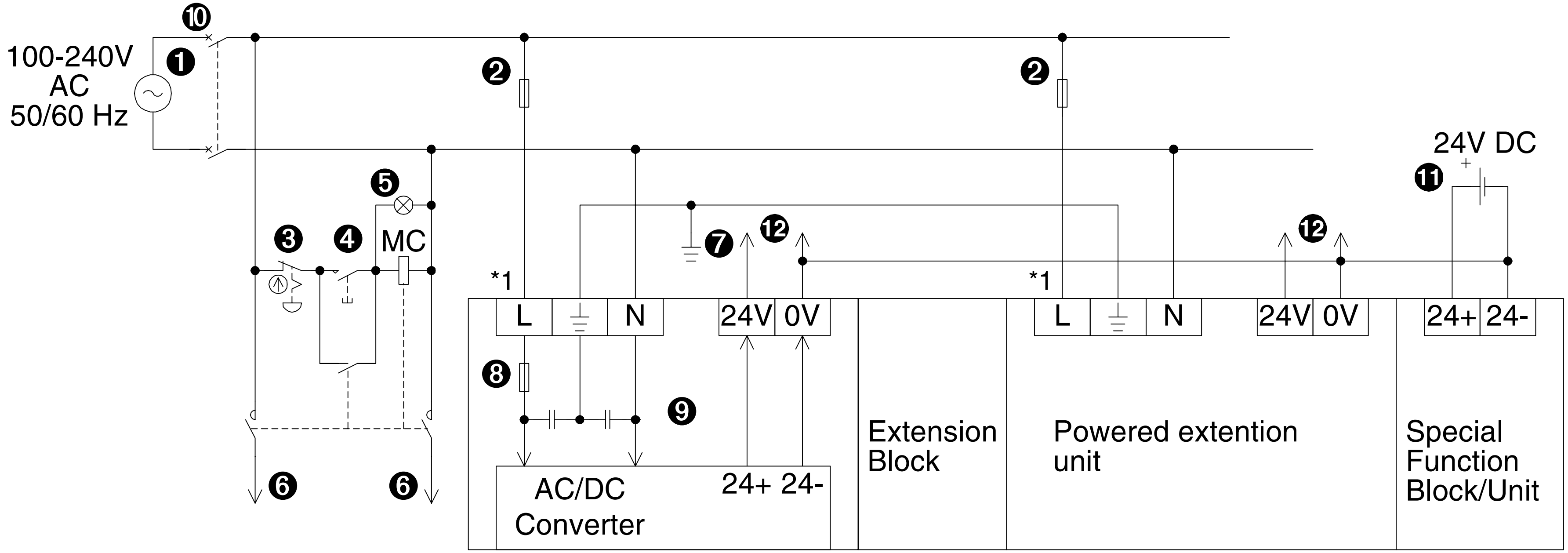
Table 4.2 :DC Power Supply Units

	FX1N-14M	FX1N-24M	FX1N-40M	FX1N-60M
Power supply	24V DC +20% ~ 12V DC -15% (28.8 ~ 10.2V DC)			
Max. allowable momentary power failure period	5 ms; If less than 5 ms, the PLC will continue operation. If 5 ms or more, the PLC will shut down			
Fuse (size) rating	125 V 3.15A			
In-rush current	24V DC - Max. 25A for 1ms 12V DC - Max. 22A for 0.3ms			
Power consumption*1	13W	15W	18W	20W

*1 Includes the input current (5 or 7mA per point).

4.5 Example Wiring

4.5.1 AC Power supply



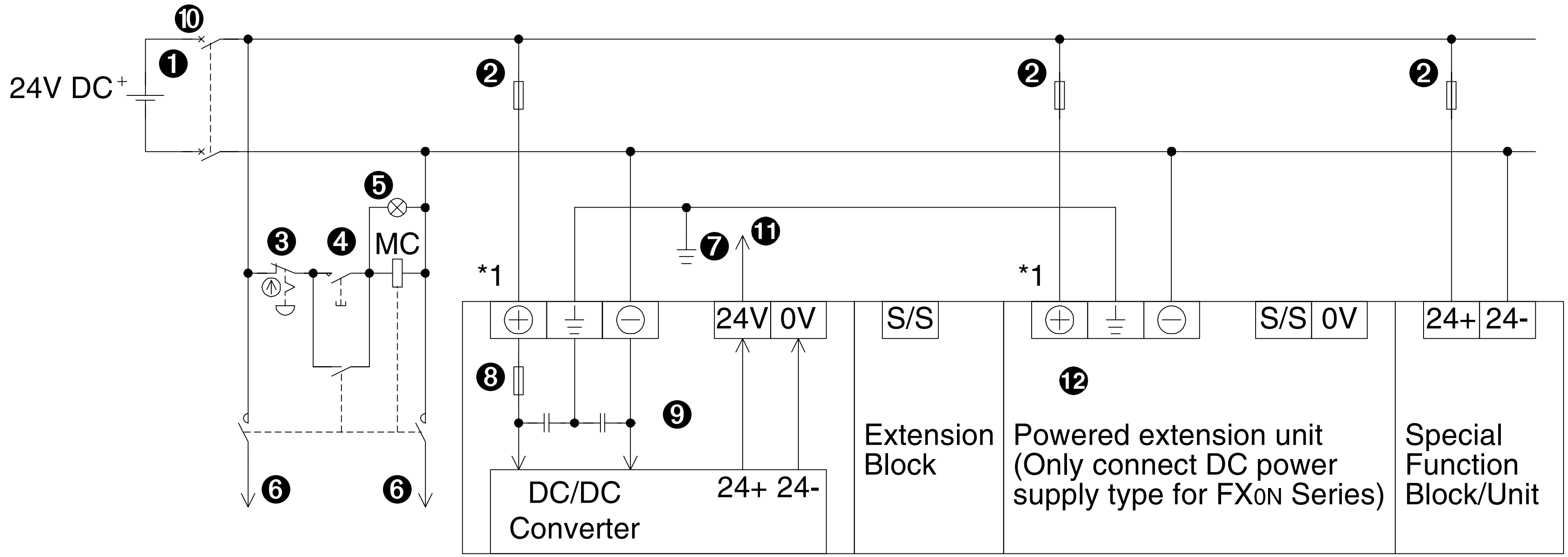
*1 It is recommended to use the same power source to power the main unit, powered extension units and special function blocks/units. If two sources are required, follow the below guidelines:

- Supply power to the powered extension units and special function blocks/units before or at the same time the main unit is powered.
- The power supplies may be cut the same time after ensuring system safety.

❶	AC Power supply 100 - 240V AC, +10% -15%, 50 - 60 Hz
❷	Circuit protector or Fuse
❸	Emergency stop
❹	Power supply switch
❺	Power ON pilot indicator
❻	Power supply for loads

❼	Grounding resistor 100Ω or less
❽	Fuse
❾	Main unit
❿	Breaker
⓫	DC Power supply 24V DC
⓬	Service Power Supply, 24V DC 400mA

4.5.2 24V DC Power supply



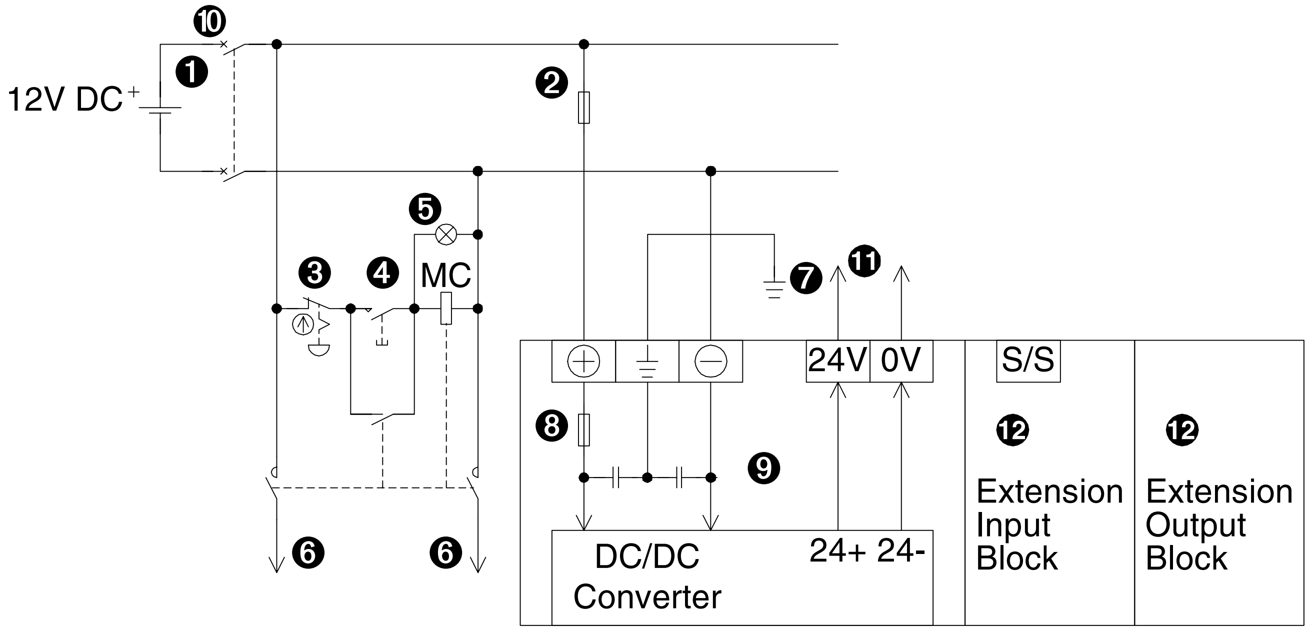
*1 It is recommended to use the same power source to power the main unit, powered extension units and special function blocks/units. If two sources are required, follow the below guidelines:

- Supply power to the powered extension units and special function blocks/units before or at the same time the main unit is powered.
- The power supplies may be cut the same time after ensuring system safety.

❶	DC Power supply, 24V DC, +10% -15%
❷	Circuit protector or Fuse
❸	Emergency stop
❹	Power supply switch
❺	Power ON pilot indicator
❻	Power supply for loads
❼	Grounding resistor 100Ω or less

❽	Fuse
❾	Main unit
❿	Breaker
⓫	Power supply for the input circuitry of the main unit and extension blocks that are connected.
⓬	Powered extension unit of 24V DC supply type for FX0N Series (FX0N-40ER-DS or FX0N-40ET-DSS)

4.5.3 12V DC Power Supply



❶	DC Power supply, 24V DC, +10% -15%
❷	Circuit protector or Fuse
❸	Emergency stop
❹	Power supply switch
❺	Power ON pilot indicator
❻	Power supply for loads
❼	Grounding resistor 100Ω or less

❽	Fuse
❾	Main unit
❿	Breaker
⓫	Power Supply for the input circuitry of the main unit and extension blocks that are connected.
⓬	When using a 12V DC power supply, extension blocks occupying up to 32 I/O points are connected.

4.6 Service Power supply

An AC powered FX1N can supply a service current of 24V DC at 400mA when used on its own and, when used with extension or special function blocks.

A DC powered FX1N does not have the capacity to supply a service current. However Additional extension blocks can be powered from the main units power supply.

4.7 Earthing / Grounding

STOP

Use a cable at least 0.2mm^2 (AWG24) to ground equipment. Ground resistance must be less than 100Ω. Note that the ground cable must not be connected to the same ground as the power circuits.

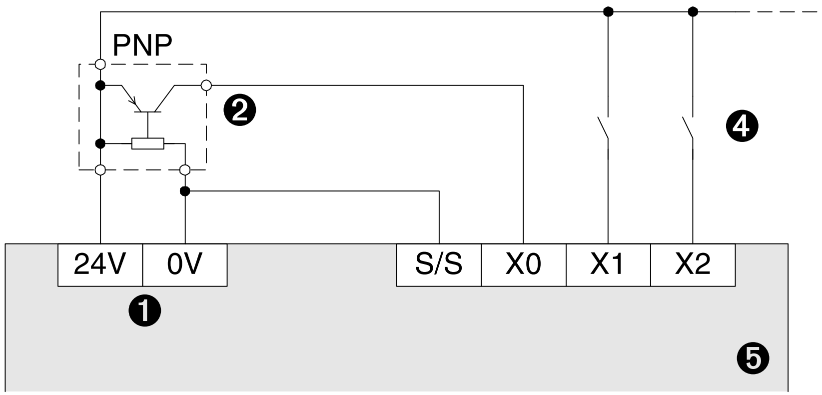
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5. Inputs

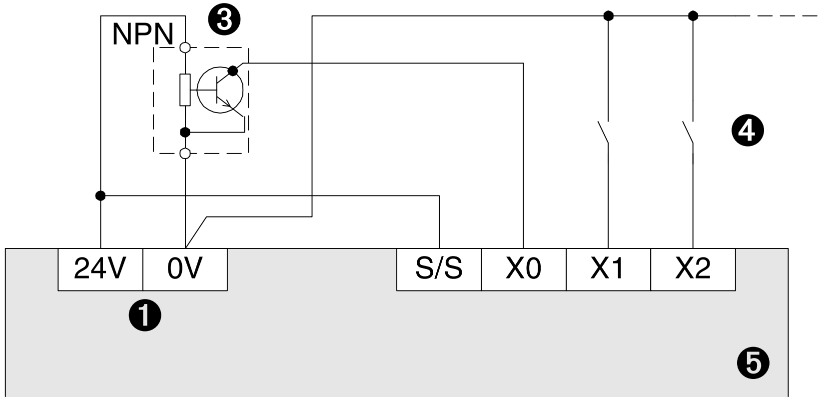
5.1 24V DC input Specifications

		FX1N main unit, extension block		FX0N, FX2N Extension block
		X0 → X7	X10 → ∞	
Input voltage		24V DC ±10%		
Input current		24V DC, 7mA	24V DC, 5mA	24V DC, 5mA
Input switching current	OFF → ON	>4.5mA	>3.5mA	>3.5mA
	ON → OFF	<1.5mA		
Response time		10ms		
Variable response time		X000-X007 0-15ms		---
Circuit isolation		Photocoupler		
Operation indication		LED is lit		

5.1.1 Typical Wiring



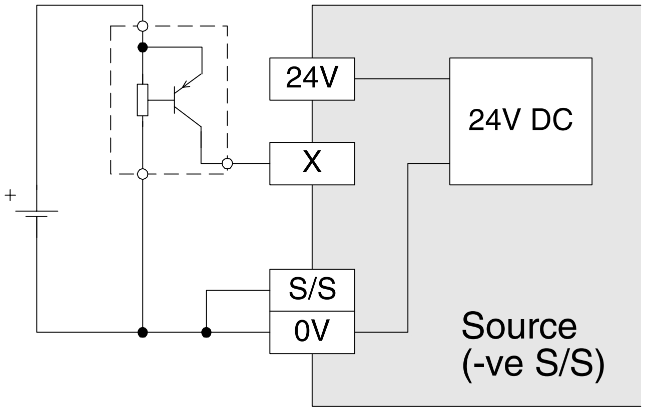
❶	AC model - Service supply DC model - Input circuit power supply
❷	PNP Sensor
❸	NPN Sensor
❹	Input Device Contact
❺	Main unit

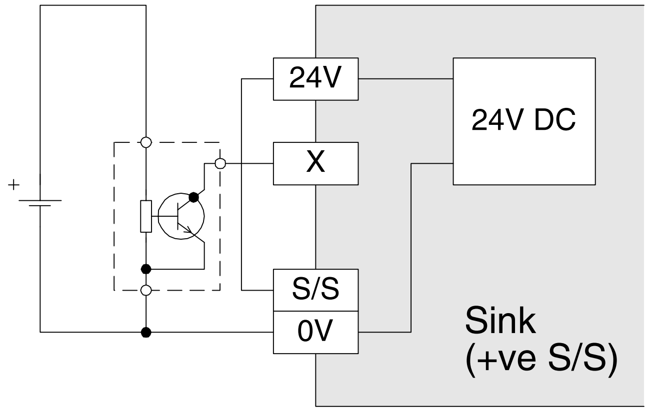


Note: The input circuit power supply provides a clean +24VDC supply for the inputs. Hence use an external +24VDC power supply at your own risk.
The input circuit power supply cannot provide a service supply to special function blocks (SFB). Use an external supply to power the SFBs.
When using an AC powered unit, an external 24V DC supply can be used.

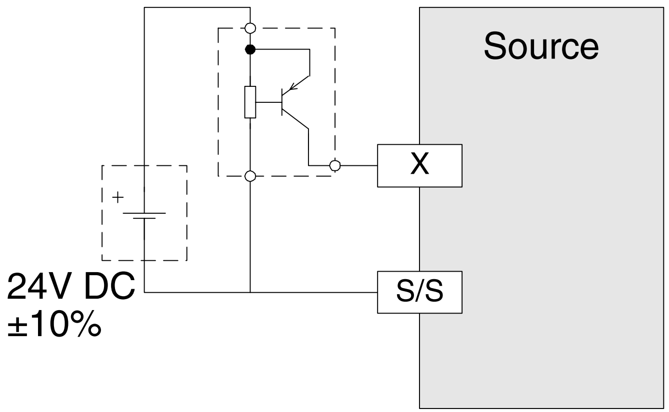
5.1.2 Input Circuit Connection

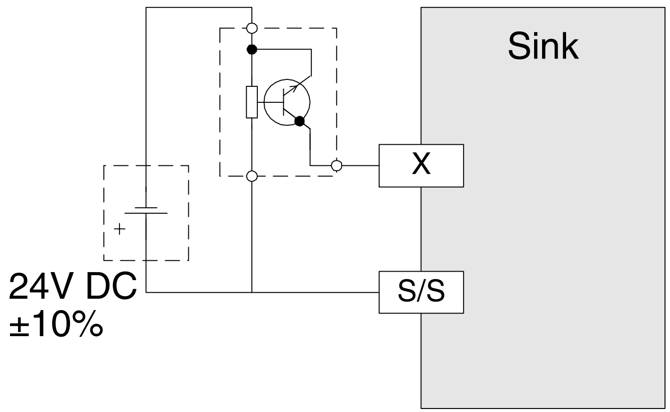
FX1N Main and FX0N/FX2N Extension Units





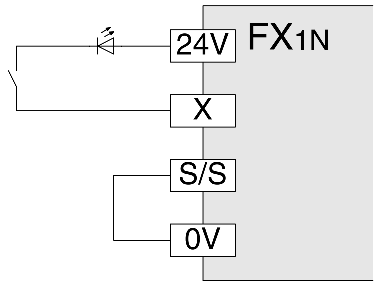
FX2N and FX0N Extension blocks

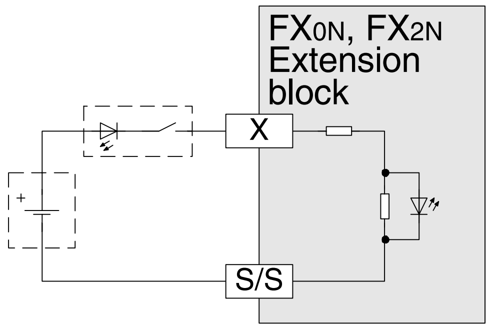




5.1.3 Diodes and Inputs Connected in Series

Vdrop across the diode Max. 4V
No more than 2 LEDs should be connected in series.





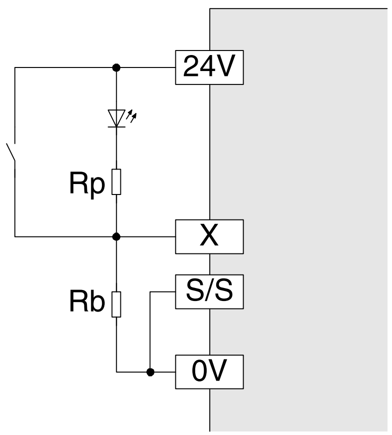
5.1.4 Resistors and Inputs Connected in Parallel

Parallel resistance Rp: FX1N = 15kΩ. If resistance Rp is less than the stated value, then add Rb. See equation 1 for Rb calculation.
Alternatively; Current leakage: FX1N = 1.5mA. If the current leakage is greater than the stated value, then add Rb. See equation 2 for Rb calculation.

Parallel LED

Eqn 1 : $Rb \leq \frac{4Rp}{15 - Rp}$

Eqn 2 : $Rb \leq \frac{6}{I - 1.5}$

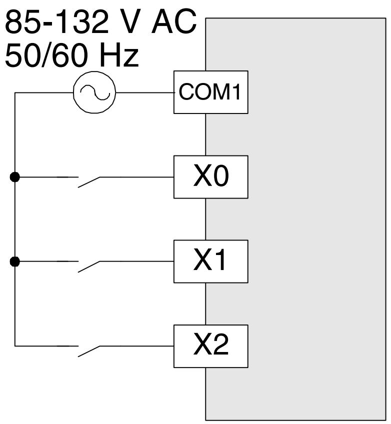


5.2 AC110V Input Extension Block

Input voltage	85-132V AC 50-60Hz
Input impedance	21kΩ/50HZ 18kΩ/60Hz
Input current	4.7mA 100V AC/50Hz 6.2mA 110V AC/60Hz
OFF → ON/ON → OFF; input switching current	80V 3.8mA/30V 1.7mA
Response time	25ms
Circuit isolation / Operation indication	Photocoupler/LED is lit

5.2.1 Input Circuit Connection

FX0N-8EX-UA1/UL
FX2N-8EX-UA1/UL



5.2.2 Programming Caution

When using 110V AC units, high speed counter and interrupt routines are not suitable for use due to the long 'ON/OFF' times. The following instructions are also not suitable.

FNC 52 MTR

FNC 56 SPD

FNC 72 DSW

6. Outputs

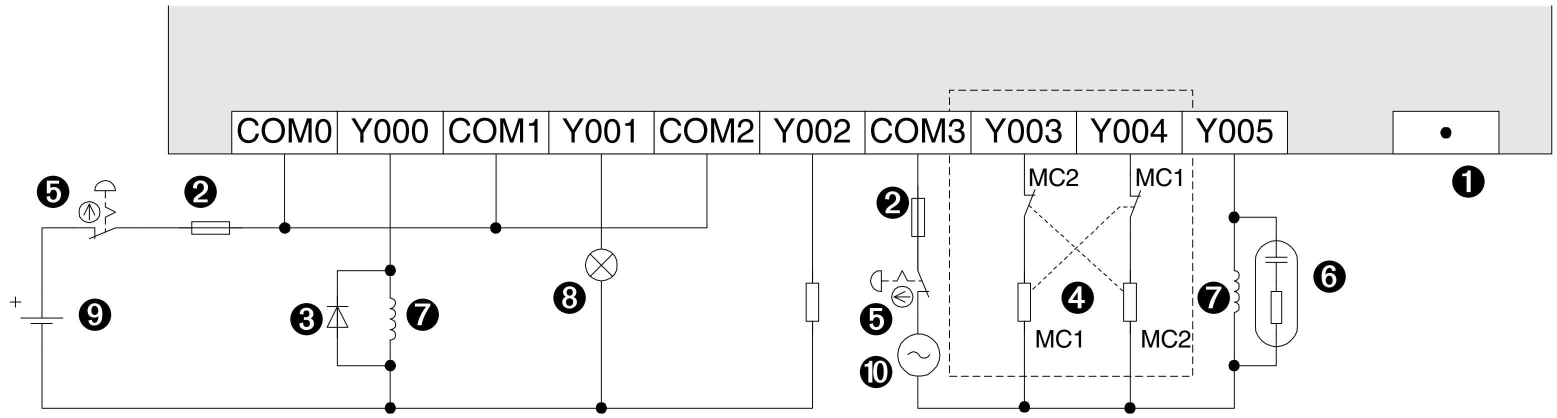
6.1 Output Specifications

Description		Relay Output	Transistor Output
Switched voltages (resistive load)		≤ 240V AC, ≤ 30V DC	5-30V DC
Rated current / N points (resistive load)		2A/1 point, 8A/COM	0.5A/1 point, 0.8A/COM
Max. Inductive load		80VA, 120/240V AC	12W/24V DC
Minimum load		When supply voltage < 5V DC allow at least 2mA flow	-
Response time (approx.)	OFF → ON	10ms	< 0.2ms; < 5µs (Y000,Y001 only)
	ON → OFF	10ms	< 0.2ms (I > 0.2A); <5µs (Y000,Y001 only)
Circuit isolation		By Relay	By Photo Coupler
Open circuit current leakage		-	0.1mA/30V DC
Operation indication		LED is lit when coil is energized	
Output protection	Internal device	None	
	Outside device (Fuse)	Rated value according to the load.	

1 2 3 4 5 6 7

6.2 Relay Output Example

Typical Relay



➊	Do not use this terminal
➋	Fuse
➌	Reverse-current protection diode (See section 6.4)
➍	External Mechanical Interlock (See section 6.4)
➎	Emergency Stop
➏	Surge absorber (0.1µF capacitor + 100-120Ω resistor) (See section 6.4)

➐	Inductive load
➑	Incandescent Lamp
➒	DC Power Supply
➓	AC Power Supply

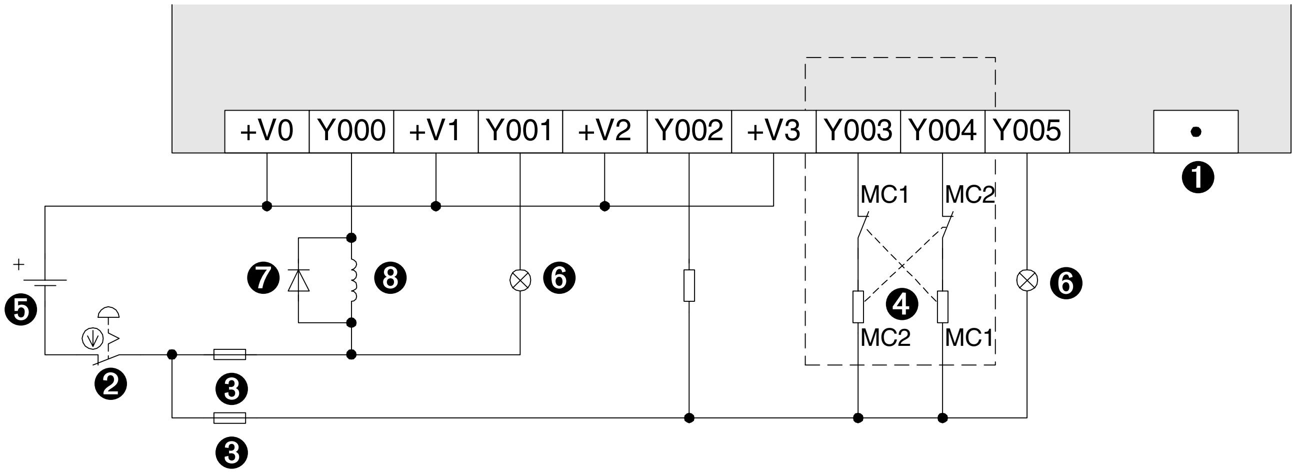
6.2.1 Reliability Tests

The test results in the table below were gathered from a 1 sec ON/OFF test cycle. Please note that the over current induced by in-rush greatly reduces the relay contact's service life. The rated life for an inductive AC load such as a conductor or solenoid valve is 500,000 operations at 20VA.

	20VA	35VA	80VA
Load capacity	0.2A/100VAC 0.1A/200VAC	0.35A/100V AC 0.17A/240V AC	0.8A/100V AC 0.4A/240V AC
Life of contact (cycles)	3,000,000	1,000,000	200,000
Example load (Mitsubishi contactor)	S-K10 ~ S-K95	S-K100 ~ S-K150	S-K180,S-K400

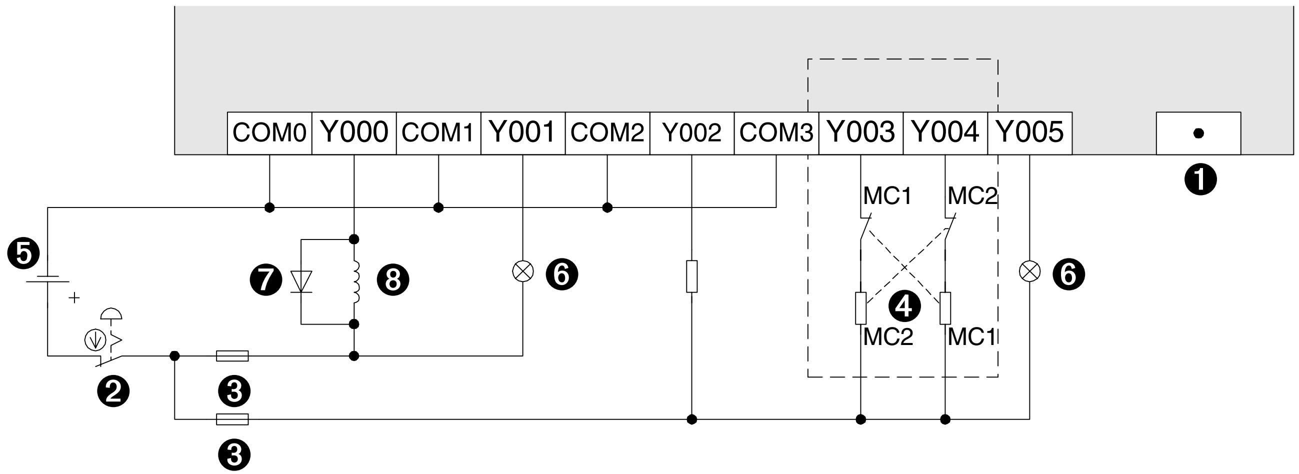
6.3 Transistor Output Example

6.3.1 Transistor Output Writing Diagram (Source Type)



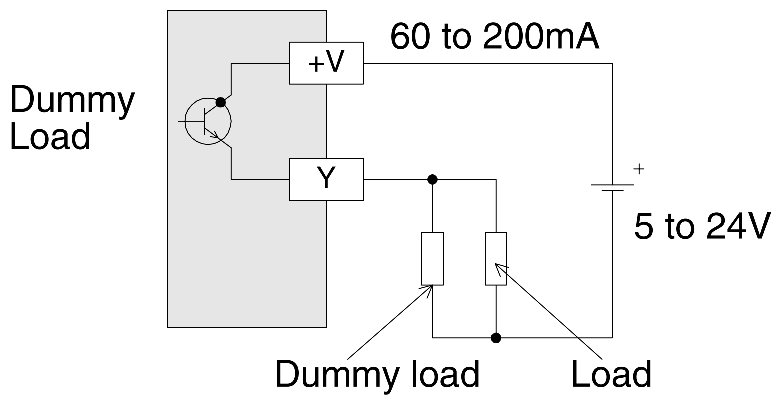
❶	Do not use this terminal
❷	Emergency Stop
❸	Fuse
❹	External Mechanical Interlock (See Section 6.4)
❺	DC Power Supply
❻	Incandescent Lamp
❼	Reverse-current protection diode
❽	Inductive load

6.3.2 Japanese Model Transistor Output (SInk Type)



6.3.3 Response Times

OFF times increase as the load current decreases.
For improved response times use a 'dummy' resistor, see the figure below. If a response time of 0.5 ms or better is required when using 'light loads' use a 'dummy' resistor and ensure the signal line has a current greater than 60mA/24V DC



Y000 and Y001 are high speed response outputs with the following characteristics:

10 - 100mA at 5 - 24V DC, 100kHz maximum output signal.

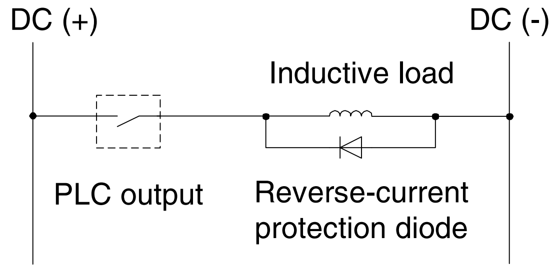
If a high speed response is required, a current of 10 - 100mA must be used.

6.4 Applying Safe Loads

Caution for DC Loads

1) Relay output case

This PLC does not have any internal protection circuitry on the relay outputs. For switching direct current on inductive loads, a reverse-current protection diode should be installed in parallel with the load. The relay contact life decreases significantly if this is not done.

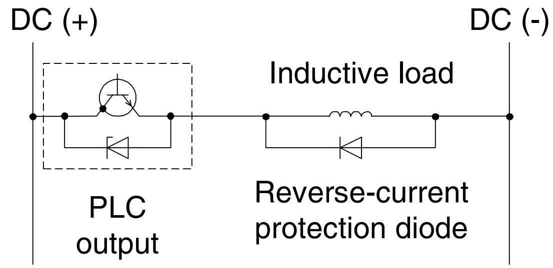


The reverse-current protection diode needs to satisfy the following specifications.

- The diode is rated for maximum reverse voltage of 5 to 10+ times the load voltage.
- The forward current is more than the load current.

2)Transistor output case

Transistor outputs use internal zener diode (50V) as protection circuitry. When driving the inductive load with transistor output, a reverse-current protection diode can be installed in parallel with the load if necessary.



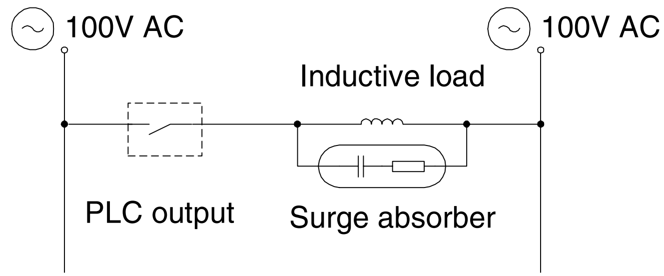
The reverse-current protection diode needs to satisfy the following specifications.

- The diode is rated for maximum reverse voltage of 5 to 10+ times the load voltage.
- The forward current is more than the load current.

Caution for AC Loads

1) Relay output case

This PLC does not have any internal protection circuitry on the relay outputs. For switching AC on inductive loads, a surge absorber (0.1μF + “100 to 120Ω”) should be installed in parallel with the load. The relay contact life decreases significantly if this is not done.
Besides protecting the internal circuity of the PLC, a surge absorber decreases the noise emissions to the load.

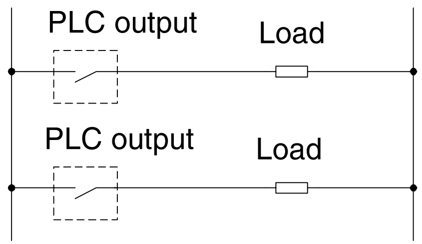


Component Side of Loads

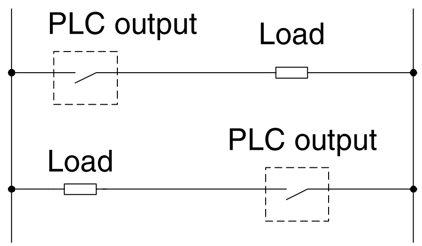
The output contact of the PLC should be connected to components consistently as indicated in the figure

Note: If using another output type, please replace symbol with appropriate symbol.

OK!!



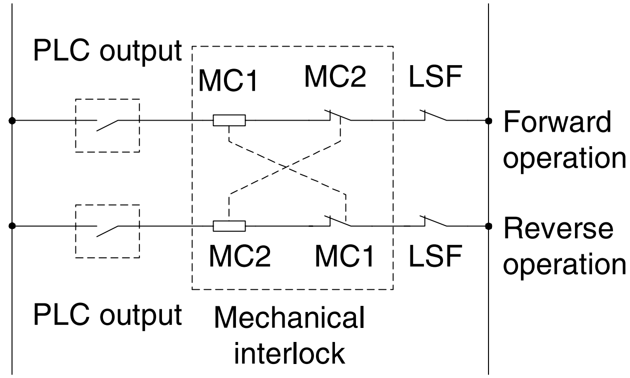
NG!!



Mechanical Interlock

Ensure all loads are applied to the same side of each PLC output, see previous figures. Loads which should NEVER simultaneously operate (e.g. direction control of a motor), because of a critical safety situation, should not rely on the PLC's sequencing alone. Mechanical interlocks MUST be fitted to all critical safety circuits. (See proceeding figure.)

Note: If using another output type, please replace symbol with appropriate symbol.



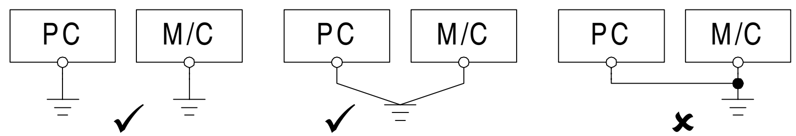
7. Diagnostics

7.1 Preliminary Checks

POWER □ RUN □ ERROR □	Check power supply, ground and I/O cables are wired correctly.
POWER ■ RUN □ ERROR □	Turn the power supply on. Check that the power LED is lit. Down load a small test program to the PLC. Verify the program to ensure it has been written to the PLC correctly. Using the programming device, force each output ON/OFF. Check the output LEDs for operation.
POWER ■ RUN ■ ERROR □	Put the PLC into RUN. Check the RUN LED is lit. Check that the previously down loaded program works correctly. Once all checks are complete take the PLC out of run and turn OFF the power supply.
	During this testing stage take extreme care not to touch any live or hazardous parts.

7.2 ERROR LED ON (CPU ERROR)

POWER ■ RUN □ ERROR ■	**Fault** ERROR LED ON	**Remedy** Reset PLC. Power OFF,ON and trigger RUN input.	**Possible results**	LED OFF	Has the memory cassette been installed or removed while the units has still been powered?
				LED is lit	(A)

(A)	**Remedy** Power OFF Disconnect earth/ ground terminal Power ON	**Possible results**	LED is lit	(B)
			LED is flashing	Check for programming error. Ensure the earth/ ground cable is correctly rewired. 

(B)	**Remedy** Possible program/scan time error. Check D8012 for program scan time, (units 0.2 ms must be less than 0.2 s, i.e data value <2000).	Possible results D8012 > D8000

7.3 Common Errors

- Corroded contact points at some point in an I/O line.
- An I/O device has been used outside its specified operating range.
- An input signal occurs in a shorter time period that taken by one program scan.

7.4 Maintenance

- Check interior temperature of the panel.
- Check panel air filters if fitted.
- Check for loosening of terminals or mounting facilities (due to vibration).

7.5 Operation and Error Flags

M8004 (ref. 8004)	Error occurance (ON when M8060-7 are ON)
M8035	Forced RUN mode
M8036	Forced RUN signal
M8037	Forced STOP signal
M8039 (ref. D8039)	Constant scan mode

M8061 (ref. D8061)	PC hardware error
M8063 (ref. D8063)	Parallel link error
M8064 (ref. D8064)	Parameter error
M8065 (ref. D8065, D8069)	Syntax error
M8066 (ref. D8066, D8069)	Program (circuit) error
M8067 (ref. D8067, D8069)	Program execution error
M8068 (ref. D8068)	Execution error latch

7.6 PLC Status Registers

D8000 (default 200ms)	Watchdog timer
D8001	PLC version 26100 = FX_{1N} Version 1.00 26 = FX_{1N}, 100 = Version 1.00
D8002	Memory capacity 0008=8K steps
D8003	Memory type 02H=EEPROM protect switch OFF 0AH=EEPROM protect switch ON 10H=MPU memory
D8004	Error flag number 8060=M8060, (8060-8068)

7.7 Error Registers

D8061	Error code for PLC hardware error
D8063	Error code for parallel link fault
D8064	Parameter error code
D8065	Syntax error code
D8066	Program (circuit) error code
D8067	Program execution error code
D8068	Latched step number of execution error
D8069	Step number of errors associated with error flags M8065-M8067

7.8 Error Codes

D8061		Check cable connections
	0000	No error
	6101	RAM error
	6102	Operation circuit error
	6103	I/O bus error (M8069 = ON)
D8062		Check the programmer / PC connections
	0000	No error
	6201	Parity/overrun/framing error
	6202	Character error
	6203	Data sum check error
	6204	Data format error
	6205	Command error

D8063		Check both power and communications connections
	0000	No error
	6301	Parity/overrun/framing error
	6302	Character error
	6303	Data sum check error
	6304	Data format error
	6305	Command error
	6306	Watchdog timer error

7.9 Instruction List

		0	1	2	3	4	5	6	7	8	9
000	Program Flow	CJ	CALL	SRET	IRET	EI	DI	FEND	WDT	FOR	NEXT
010	Transfers, Comp	CMP	ZCP	MOV			BMOV			BCD	BIN
020	+ - x /, Logics	ADD	SUB	MUL	DIV	INC	DEC	WAND	WOR	WXOR	
030	Shift					SFTR	SFTL			SFWR	SFRD
040	Data Operation	ZRST	DECO	ENCO							
050	High Speed	REF		MTR	HSCS	HSCR		SPD	PLSY	PWM	PLSR
060	Handy Instructions	IST		ABSD	INCD			ALT	RAMP		
070	FX I/O Devices			DSW		SEGL				FROM	TO
080	FX Serial Devices	RS	PRUN	ASCI	HEX	CCD	VRRD	VRSC		PID	
150	Positioning						ABS	ZRN	PLSV	DRVI	DRVA
160	Real Time Clock	TCMP	TZCP	TADD	TSUB			TRD	TWR		HOUR
170	Special Comms							RD3A	WR3A		
220	In-line Compare					LD=	LD>	LD<		LD≠	LD≤
230		LD≥		AND=	AND>	AND<		AND≠	AND≤	AND≥	
240		OR=	OR>	OR<		OR≠	OR≤	OR≥			

	Symbol	FNC No	D	P
A	ABS	155		
	ABSD	062		
	ADD	020		
	ALT	066		
	AND□	232-238		
	ASCI	082		
B	BCD	018		
	BIN	019		
	BMOV	015		
C	CALL	001		
	CCD	084		
	CJ	000		
	CMP	010		
D	DEC	025		
	DECO	041		
	DI	005		
	DIV	023		
	DRVA	159		
	DRVI	158		
	DSW	072		

	Symbol	FNC No	D	P
E	EI	004		
	ENCO	042		
F	FEND	006		
	FOR	008		
	FROM	078		
H	HEX	083		
	HOUR	169		
	HSCR	054		
	HSCS	053		
I	INC	024		
	INCD	063		
	IRET	003		
	IST	060		
L	LD□	224-230		
M	MOV	012		
	MTR	052		
	MUL	022		
N	NEXT	009		
O	OR□	240-246		

	Symbol	FNC No	D	P
P	PID	88		
	PLSR	059		
	PLSV	157		
	PLSY	057		
	PRUN	081		
	PWM	058		
R	RAMP	067		
	REF	050		
	RD3A	176		
	RS	080		
S	SEGL	074		
	SFRD	039		
	SFTL	035		
	SFTR	034		
	SFWR	038		
	SPD	056		
	SRET	002		
	SUB	021		

	Symbol	FNC No	D	P
T	TADD	162		
	TCMP	160		
	TO	079		
	TRD	166		
	TSUB	163		
	TWR	167		
	TZCP	161		

	Symbol	FNC No	D	P
V	VRRD	085		
	VRSC	086		
W	WAND	026		
	WDT	007		
	WOR	027		
	WR3A	177		
	WXOR	028		

	Symbol	FNC No	D	P
Z	ZCP	011		
	ZRN	156		
	ZRST	040		

7.10 Device List

Item		Specification	Remarks
Program capacity		8k steps	Provided by built in EEPROM momory
I/O configuration		Max hardware I/O configuration points 128, dependent on user selection (Max. software addressable Inputs 128, Outputs 128)	
Auxiliary relay (M coils)	General	384 points	M0 to M383
	Latched (EEPROM backed-up)	1152 points EEPROM keep: 128 points Capacitor keep: 1024 points	M384 to M1535 EEPROM keep: M384 to M511 Capacitor keep: M512 to M1535
	Special	256 points	From the range M8000 to M8255
State relays (S coils)	Latched (EEPROM backed-up)	1000 points EEPROM keep: 128 points Capacitor keep: 872 points	S0 to S999 EEPROM keep: S0 to S127 Capacitor keep: S128 to S999
	Initial	10 points (subset)	S0 to S9
Timers (T)	100 msec	200 points Range: 0 to 3,276.7 sec	T0 to T199
	10 msec	46 points Range: 0 to 327.67 sec	T200 to T245
	1 msec retentive	4 point, Capacitor keep Range: 0 to 32.767 sec	T246 to T249
	100 msec retentive	6 points, Capacitor keep Range: 0 to 3,276.7 sec	T250 to T255

Item		Specification	Remarks
Counters (C)	General	16 points Range: 1 to 32,767 counts	C0 to C15 Type: 16 bit up counter
	Latched (EEPROM backed-up)	184 points Range: 1 to 32,767 counts EEPROM keep: 16 points Capacitor keep: 168 points	C16 to C199 EEPROM keep: C16 to C31 Capacitor keep: C32 to C199 Type: 16 bit up counter
	General	20 points Range: -2,147,483,648 to 2,147,483,647 counts	C200 to C219 Type: 32 bit bi-directional counter
	Latched (EEPROM backed-up)	15 points, Capacitor keep Range: -2,147,483,648 to 2,147,483,647 counts	C220 to C234 Type: 32 bit bi-directional counter
High speed counters (C) Max. 6 points	1 phase	Range: -2,147,483,648 to +2,147,483,647 counts General rule: Select counter combinations with a combined counting frequency of 60kHz or less. Note; all counters are latched (EEPROM backed-up) If high speed counter is used with the HSCS or HSCR instruction, a combined counting frequency of 30kHz or less.	C235 to C240, 6 points
	1 phase c/w start stop input		C241to C245, 5 points
	2 phase		C246 to C250, 5 points
	A/B phase		C251 to C255, 5 points

Item		Specification	Remarks
Data registers (D)	General	128 points	D0 to D127 Type: 16 bit data storage register pair for 32 bit device
	Latched (EEPROM backed-up)	7872 points EEPROM keep: 128 points Capacitor keep: 7744 points	D128 to D7999 EEPROM keep: D128 to D255 Capacitor keep: D255 to D7999 Type: 16 bit data storage register pair for 32 bit device
	File	Maximum 7000 points	D1000 to D7999 set by parameter in 14 blocks of 500 program steps Type: 16 bit data storage register
	Externally adjusted	2 points Range: 0 to 255	D8030 & D8031 Data is entered indirectly through the external setting potentiometer
	Special	256 points (inclusive of D8030 and D8031)	From the range D8000 to D8255 Type: 16 bit data storage register
	Index	16 points	V and Z Type: 16 bit data storage register
Pointers (P)	For use with CALL	128 points	P0 to P127
	For use with interrupts	6 points	I00❏ to I50❏ (rising trigger ❏ = 1, falling trigger ❏ = 0)
Nest levels		8 points for use with MC and MCR	N0 to N7

Item		Specification	Remarks
Constants	Decimal K	16 bit: -32,768 to +32,767 32 bit: -2,147,483,648 to +2,147,483,647	
	Hexadecimal H	16 bit: 0000 to FFFF 32 bit: 00000000 to FFFFFFFF	

HARDWARE MANUAL

FX1N SERIES PROGRAMMABLE CONTROLLERS

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
HIMEJI WORKS:840, CHIYODA CHO, HIMEJI, JAPAN

MODEL	FX1N-HW-E
MODEL CODE	09R511

JY992D89301K
(MEE)

Effective Nov. 2005
Specification are subject to change without notice.